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

VOL. XXXV.



THE  
CYCLOPÆDIA;

OR,

UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY

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

WITH THE ASSISTANCE OF  
EMINENT PROFESSIONAL GENTLEMEN.

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ILLUSTRATED WITH NUMEROUS ENGRAVINGS,  
*BY THE MOST DISTINGUISHED ARTISTS.*

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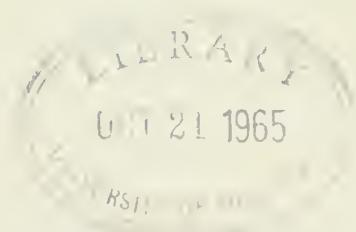
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# CYCLOPÆDIA:

OR, A NEW

## UNIVERSAL DICTIONARY

OF

### ARTS and SCIENCES.

T

**T**, A consonant, and the nineteenth letter in the alphabet; the sound of which is formed by a strong expulsion of the breath through the mouth, upon a sudden drawing back of the tongue from the fore part of the palate, with the lips at the same time open.

The T, at the beginning and end of words, has always the same sound, nearly resembling that of D, for which reason they are often put for each other; and Quintilian even rallies those who made any scruple of writing the one indifferently for the other: as *at* for *ad*, *set* for *sed*, *haut* for *haut*, &c.

The customary sound of T is that which occurs in the words *take*, *temptation*; but before an *i*, when followed by a vowel, it has the sound of an obscure *s*, as *nation*, *salvation*, except when *s* precedes *t*, as *Christian*; and in derivatives from *y*, as *mighty*, *mightier*.

The T is one of the five consonants which the abbot de Dangeau calls *palatal*: these five are *D*, *T*, *G*, *K*, and *N*; the four first of which have the same relation to each other, as the labials *B-P* and *V-F* have; *D*, for instance, having the same relation to *T*, that *B* has to *P*, and *V* to *F*.

The T, the same author observes, is a letter of a strong sound; so that a feeble one cannot be heard before it. Hence, to form the supine of *rego*, the *T* of *tum* changes the *g*, and strengthens it to the sound of a *c*, so that we say *rectum*; as in the preterperfect tense *rexi*, which we pronounce *recksi*.

*Th* has two sounds: the one soft, as *thus*; the other hard, as *thing*. The sound is soft in these words, *then*, *thence*, *there*, with their derivatives and compounds, *that*, *these*, &c.; and in all words between two vowels, as *father*; and between *r* and a vowel, as *burthen*. In other words it is hard, as *thick*, *thunder*. Where it is softened at the end of a word, an *e* silent must be added, as *breath*, *breathe*. Johnson.

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T

T is used as an abbreviature on ancient monuments, &c. for Titus, Titius, and Tullius.

T, among the *Ancients*, was used as a numeral letter, signifying 160, according to the verse,

“ T quoque centenos & sexaginta tenebit.”

When a dash was at the top, thus,  $\overline{T}$ , it signified 160 thousand.

T, with a kind of acute accent over it, denoted among the Greeks 300; and if the accent was below it, thus  $\underset{\cdot}{T}$ , it denoted 300,000. The ט of the Hebrews signified 9; and with two points fixed horizontally over it, thus,  $\overline{\text{ט}}$ , it signified 9000.

Sometimes an acute accent over this, or any one of the first nine letters, multiplies its value by a thousand.

We shall here observe, that the number 15 should be represented by יה, *i. e.* 10 and 5; but, because these letters constitute part of the word יהוה, *Jehovah*, the letters ט, *i. e.* 9 and 6, represent 15, to prevent, as the Jews allege, the profanation of the peculiar name of God. For the same reason, ט, *i. e.* 9 and 7, are used instead of י, *i. e.* 10 and 6, to express 16.

T, on the French coins, denotes those that were struck at Nantes.

When the Roman tribunes approved of the decrees of the senate, they testified their consent by subscribing a T.

T, in *Music*, is the initial of tenor, vocal and instrumental; of *tacet*, for silence: as *adagio tacet*, when a performer is to rest during the whole movement. In concertos and symphonies, *t* is the initial of *tutti*, the whole band, after a solo part. It also frequently stands for *trillo*, or *tr*, a shake.

T is also a mark or brand, with which by stat. 4 Hen. VII. every person convicted of felony, false murder, and admitted

B

to

to the benefit of the clergy, shall be marked on the brawn of the left thumb.

T, or TAU, in *Heraldry*, is a kind of cross-potent, or truncated; found in all the armories of the commanders of the order of St. Anthony.

The azure T, or Tau, is seen in arms above 400 years old. Its origin, according to some authors, is taken from the Apocalypse; where the same is a mark that the angel impresses on the foreheads of the elect: others take it to represent a crutch, a symbol proper enough for this order, which was sworn to hospitality. But the truth, F. Menefrier observes, is, that it is the top of a Greek crossier.

The bishops and abbots of the Greek church wear it still; and if it be found on the habit of St. Anthony, it is only to shew that he was an abbot.

T *Bandage*, in *Surgery*, is so called from its resembling that letter in shape. It consists of two bands of linen, of greater or lesser breadth, according to circumstances. The transverse piece of the bandage serves to go round the body above the hips. The perpendicular portion is sewed at one of its ends to the middle and back point of the band, which surrounds the pelvis; and its other or anterior extremity is generally slit into two portions, or tails, about six or eight inches in length. The perpendicular piece of the T bandage applies itself between the glutæi muscles and to the perinæum; while the two tails, which we have just now described, are carried between the thighs and the pudenda to the right and left, and are lastly fastened to the transverse piece, which surrounds the body. The T bandage is chiefly employed for keeping on the dressings, after the operation for the fistula in ano, in diseases of the perinæum, and in those of the anus, groins, &c.

Besides the common T bandage, surgeons make use of another, which they call *double*, and which is furnished with two perpendicular pieces, sewed to the transverse one, about four inches apart. The double T bandage is represented to be particularly calculated for cases of lithotomy, and for diseases in the perinæum; because the two perpendicular bands may be made to cross each other on the part affected, and leave the anus uncovered; an advantage which the single T bandage certainly has not.

The T bandage admits of application also in other modes. When the cross band is broad, it may be applied round the chest, while the perpendicular portion, being slit into two, may be made to pass over the shoulders, so as to keep the bandage from slipping downward. There is no kind of bandage which can be more conveniently applied to the chest, than that which has just now been described. See **BANDAGE**.

TA, in *Geography*, a fortified city of China, of the second rank, in the province of Se-tchuen; 650 miles S.W. of Peking. N. lat.  $31^{\circ} 18'$ . E. long.  $107^{\circ} 15'$ .—Also, a river of China, which runs into the East sea, N. lat.  $36^{\circ} 55'$  E. long.  $121^{\circ} 34'$ .

TA, *Lough*, a lake of the county of Wexford, Ireland, not far from Carnfore Point. It receives two or three smart rivulets, and having no outlet, the waters accumulate, and gradually overflow the adjacent grounds; till the peasantry, once in three or four years, let them off, by making a cut through the high sand-bank that parts the lake from the sea; which cut very soon fills up again.

TA, a name given in China to their pagodas. These are most numerous in hilly parts of the country, upon the summits of which they are frequently erected. They are generally from 120 to 160 feet high, which height is equal to four or five of their diameters at the base; and they consist mostly of an unequal number, five, seven, or nine galleries

or stories, diminishing as they rise, with as many projecting roofs.

TA, τα, one of the four syllables used by the ancient Greeks in solmifation, or the first lessons in singing.

TAAIF, in *Geography*, a town of Arabia, in the province of Hedjsas, situated upon a lofty mountain, in a country so agreeable, that the Arabs compare its environs to those of Damascus and Sana. This city supplies Jidda and Mecca with excellent fruits, particularly raisins; and carries on a considerable trade in almonds, which abound in its territories. Near Taaif is the lofty mountain of Gazvan, which, according to Arabian authors, is covered with frost and snow in the midst of summer.

TAAMBOOTERA, a large town of the Birman empire, on the Irawaddy.

TAAPAN, a town on the east coast of Mindanao. N. lat.  $7^{\circ} 38'$ . E. long.  $124^{\circ} 5'$ .

TAAS, or TAÆS, a city of Arabia, in the province of Yemen, situated at the foot of the fertile hill of Sabber, and encompassed with a wall, between 16 and 30 feet thick, and flanked with several towers. Within the circuit of the wall stands the fortress of Kahlre. The city has only two gates, each fortified with three towers; affording a very insufficient defence against any assault but that of Arabs, unskilled in the use of artillery. The saint who is the patron of TAÆS is the famous Ismael Mulk, reported by tradition to have been once king of this country. His remains are interred in a mosque bearing his name. Near this mosque is a garden, which was possessed by Ischia, his son. The city has several other deserted and ruinous mosques. The last lords of TAÆS have chosen to distinguish themselves, not by mosques, but by noble palaces, and have contented themselves with a small kubbet for their oratory and burial-place. These palaces are now the ornaments of the city. Near the city are the ruins of two ancient cities: one called Thobad, situated near mount Sabber; and the other Oddena, upon the summit of mount Sabber, over-against Kahlre. This was formerly the residence of the kings of the country. Its only remains are the ruins of some mosques. TAÆS has undergone several revolutions; but after various events, which we cannot recite, the Imam sent a Dola to this city, and it is now under the same government as the other cities in his dominions; 48 miles E.N.E. of Mochia. N. lat.  $13^{\circ} 33'$ . E. long.  $44^{\circ} 10'$ .

TAASINGE, an island of Denmark, about 16 miles in circumference, situated between Funen and Langeland, with a town upon it of the same name. N. lat.  $55^{\circ}$ . E. long.  $10^{\circ} 37'$ .

TAAUT, ΤΙΟΥΤ, or *Thot*, in *Ancient Mythology*, the name of a deity among the Phœnicians, and probably the same with the Egyptian *Thoyt*, *Thot*, or *Hermes*, the *Theutate* or *Teutat* of the Greeks, and the *Mercury* of the Latins. His cosmogony has been transmitted to us by the Phœnician writer Sanchoniathon, whose account is preserved by Eusebius, De Præp. Ev. lib. i. cap. 10. To him the Phœnicians ascribe the first invention of letters. See **MERCURY**.

TAAWIRRY, in *Geography*, an island in the South Pacific ocean. There are two situated within the reef of the island of Otaheite, and on the east side of the main island. Within these islands there is anchorage within the reef that surrounds them. The French vessels under the command of M. Bougainville lay here. The name of the other island is Boourou.

TAB, the ancient *Arofis*, a river of Persia, in the province of Fars or Farsitan, formed by the junction of two streams, within a few miles of the town of Zeitoon. Both these

These streams take their rise in the recesses of the mountains of Fars; the first at the foot of the high hill of Kamarah, and the other near that of Ardicoone, 12 furlongs (the furlong being estimated at three English miles and three quarters) N.W. of Shirauz. This branch of the river is mentioned by Arrian in the march of Alexander. It divides Fars from Chusistan, and passes through the centre of the town of Endian, being navigable for boats of 20 tons burthen. Nine miles above the town is a ford; and 16 miles below it, the Tab falls into the sea. When the river passes Zeitoon, the waters are perfectly sweet; but in its course over the hills, towards Endian, they become corrupted, and at that place are so brackish as to be hardly fit for use.

TABA, a town of Africa, on the Grain Coast.

TABA *Islands*, four small islands in the East Indian sea, lying north-west and south-east near the east coast of Borneo. N. lat.  $2^{\circ} 6'$ . E. long.  $118^{\circ} 12'$ .

TABA, or *Tabo-feil*, in *Modern History*, a name by which the Negroes, who inhabit the Gold Coast in Africa, describe their king, whose power is very arbitrary, inasmuch that they regard him as a being superior in nature to themselves.

TABAB MANAM, in *Geography*, a town of Abyssinia; 100 miles S.S.E. of Gondar.

TABACUM, in *Botany*, whence comes its common English name Tobacco, or, at present, Tobacco. (See NICOTIANA.) Bauhin says, after Monardes, that this appellation is derived from an island so called; but it should seem to originate from the Indian name of the plant, *Tubac*, or *Tubacka*.

TABÆ, in *Ancient Geography*, a town of Asia, in Cilicia.—Also, a town of Asia, on the confines of Pisidia, on the coast of the sea of Pamphylia.—Also, the name of three towns in Asia Minor; one in Caria, another in Peræa, and a third in Lydia.

TABAFRA, in *Geography*, a town of Africa, on the Ivory Coast; 15 miles E. of Druin.

TABAGO, an island in the Pacific ocean, near the coast of Mexico; about three miles long, and two broad. It is mountainous, and on the north side the high land declines with a gentle descent to the sea. Near the strand the soil is a black mould, and deep, but towards the top of the mountain strong and dry. The north side of the island makes a very pleasant appearance, and seems to be a garden of fruit-trees, inclosed with others of the forest-kind. The principal products are plantains and bananas, which grow very well from the foot to the middle of the mountain; but those near the top are small, as wanting moisture. There was formerly a small town near the sea, on the north side of the island; but it was ruined by the privateers that then frequented those seas. Before it is a good road, about a mile from the shore, where ships may ride very safely in 16 or 18 fathom water; 18 miles S. of Panama. N. lat.  $8^{\circ} 40'$ . W. long.  $80^{\circ} 9'$ .

TABAGUILLA, or *Little Tabago*, a small island in the Pacific ocean, near Tabago.

TABAJANA, a town of Africa, in the country of Woolly; 12 miles W.S.W. of Medina.

TABALLAR POINT, a cape on the east coast of the island of Borneo. N. lat.  $2^{\circ} 12'$ . E. long.  $117^{\circ} 4'$ .

TABALTHA, in *Ancient Geography*, a town of Africa, on the route from Tuburbum to Tacapæ, between Cellæ Picentiniæ and Septimunicia. Anton. Itin.

TABALUM, a town of Asia Minor, in the vicinity of Ionia. Herodotus.

TABANA, MANKOUP, a town in the interior of the Tauric Chersonesus. Ptol.

TABANIE', in *Geography*, a town of Egypt, on the east branch of the Nile; 6 miles S.W. of Manfara.

TABANUS, the *Ox-fly*, in *Entomology*, a genus of the Diptera order of insects; the generic characters of which are, that the mouth has a fleshy proboscis, terminated by two lips, and that the rostrum is furnished with two awl-shaped palpi, placed on each side of, and parallel to, the proboscis. Gmelin, in his edition of the Linnæan system, enumerates 38 species.

The insects of this genus very much resemble those of the *Musca*; which see.

#### Species.

ROSTRATUS. With brownish eyes, and sucker of the length of the body.

BARBATUS. With black eyes, and sucker half the length of the body. Both these species are found at the Cape of Good Hope.

MAURITANUS. With blackish eyes, a black spot on the second segment of the abdomen, and sucker equal to the body. Found in Barbary and Spain.

BOVINUS. Greenish eyes; marked down the back by a series of large, whitish, triangular spots, and on each side is a similar appearance, but less distinct than that of the dorsal row. This is the largest of the British species, and, like others of its species, is seen generally in the hottest part of the day, during the middle and the decline of summer. It is very troublesome to cattle. Its larva is large and dusky yellowish, like that of a tipula, marked by transverse blackish streaks or rings; residing under ground in moist meadows, &c.; and changing into a cylindrical brownish chrysalis, with a roundish or slightly pointed extremity, from which within a month proceeds the perfect insect.

AUTUMNALIS. With glassy wings, and brown abdomen, and a whitish three-fold spot. Found in Europe.

CALANS. With green eyes, a white line on the back, and red antennæ. Found in South America.

TARANDINUS. With green eyes and feet, and the segments of the abdomen yellowish at the margin. Found in the north of Europe.

EXESTUANS. With green eyes, the segments of the abdomen white at the margin, and whitish legs. Found in Surinam.

FERVENS. With green eyes, yellow abdomen and antennæ, and brown head and thorax. Found in South America.

MEXICANUS. With a livid body, green antennæ, and greenish wings. Found in Surinam.

RUSTICUS. Cinereous, with grey eyes, and two black points in the front. An European insect.

BROMIUS. With a purple fascia about the eyes, and cinereous body. Found in Germany, and the northern part of Europe.

OCCIDENTALIS. With eyes having double brown fasciæ, a brown body, and the abdomen marked with three yellow lines. Found in Surinam.

TROPICUS. With eyes having triple purplish fasciæ, and the sides of the abdomen ferruginous. An European insect of a brown colour, smaller than *T. bovinus*, and less common, troublesome to cattle, and especially to horses.

ANTARCTICUS. With eyes like the former, black abdomen, and segments with whitish margins. Found rarely in Norway.

PLUVIALIS. With eyes waved with four-fold fasciæ, and brown-speckled wings. This is an European species, very troublesome with us in the latter part of summer, fastening

on the legs, hands, &c., and peculiarly teasing on the approach of rain.

**CÆCUTIENS.** With eyes that are of a very lucid green, marbled with black spots and streaks, and wings marked by large black bands or patches. This is an European insect, not uncommon with us in autumn.

**LUGUBRIS.** With black eyes and body, brown wings, and white spots. Found in Europe.

**MORIO.** With eyes and body wholly black, and glassy wings. An inhabitant of Barbary.

**LINEATUS.** With greenish eyes, lined thorax, obscurely blueish abdomen, and red antennæ. Found in America.

**FASCIATUS.** With green eyes, brown body, and wings having a brown fascia. Found in Sierra Leone.

**ATRATUS.** With blueish abdomen, and black wings. An American insect.

**PELLUCENS.** Black, with fasciated eyes; the first segment of the abdomen blueish, and whitish legs. A German species.

**RUFICORNIS.** With fasciated eyes, white wings, brown side, and red antennæ. Found in America.

**PAGANUS.** With green eyes, three yellow fasciæ, and both sides of the abdomen ferruginously spotted. Found in England.

**ITALICUS.** Cinereous, with brown eyes; obscure abdomen, with the base palely pellucid. Found in Italy.

**CAYENNENSIS.** With eyes brown before, and behind green; black abdomen; the second and third segments yellow, the rest white at the margin. This and the next are found in Cayenne.

**PUNCTATUS.** Cinereous, with testaceous eyes, and white wings speckled with black.

**INANIS.** Cinereous, like the former, with brown eyes, and pellucid abdomen, having a brown apex.

**BORFALIS.** With eyes having three purplish fasciæ, black abdomen, and the margins of the segments whitish. Found rarely in Norway.

**LONGICORNIS.** With spotted eyes, wings half brown, a white spot, and longer antennæ. Found in Brasil.

**STRIATUS.** Cinereous, with brown abdomen, and three abbreviated white lines. A Chinese species.

**BIDENTATUS.** Ferruginous; the abdomen having on each side two yellow spots, and the scutellum bidentated. Found in Austria.

**BISPINOSUS.** Brown, ferruginous, abdomen black at the base, and scutellum bispinose. Found in Gottingen.

**MÆRENS.** Varied with whitish and black; black eyes; white wings; side and fascia black. Found in Cayenne.

**GUINEUS.** Black, with greyish thorax; the second segment of the abdomen having on the hind part a cinereous fascia, the fourth, fifth, and sixth being on both sides cinereous, and the wings ferruginous.

**ALBIPES.** With eyes having four fasciæ; the abdomen with a black ring, and the legs white. Found in Bulgaria.

**MARITIMUS.** Cinereous, with glassy wings; margin and broad fascia black. Found in Carniola, Austria, and France.

**TABARA,** in *Geography*, a town of Spain, in the province of Leon; 14 miles N.W. of Zamora.

**TABARABA,** a river of Mexico, in the province of Veraagua, which runs into the Pacific ocean, N. lat. 8° 40'. W. long. 82° 48'.

**TABARCA,** a town of Africa, in the kingdom of Tunis, situated on the north coast, at the mouth of the Zaine, of which little but ruins are existing, and a small garrison; 60 miles N.W. of Tunis.

**TABARCA,** or *Tabaquer*, an island in the Mediterranean, near the coast of Africa, at the mouth of the river Zaine, which separates Algiers from Tunis. The Lomelines, a noble Genoese family, have been in possession of the little island that lies before Tabarca, at the mouth of the Zaine, ever since the time of the famous Andrea Doria, to whom the Tuniscans gave it, with the solemn consent of the grand seignior, in ransom for one of their princes, whom Andrea had taken captive. This place is defended by a small castle, well armed, and in good order, and protected the coral fishery which was carried on in these seas. But, in the year 1740, that monster of princes, Aly Bashaw, the reigning king of Tunis, took it by treachery from the Genoese; and, contrary to all justice and the right of nations, put some of them to the sword; and the rest, in number 300 or 400, he carried into captivity. N. lat. 36° 55'. E. long. 9° 8'.

**TABARCA.** See **PLANA.**

**TABARD,** or **TABERD,** derived from the low Latin *tabarda*, denotes a short jacket or coat, open on both sides, with a square collar and hanging sleeves. From the wearing of this garment, some of those on the foundation of Queen's college, Oxford, are called *Taberdarii*.

From an inn in Southwark, whose sign was the *Tabard*, afterwards changed to the *Talbot*, Chaucer and his companions set out on a pilgrimage to the shrine of Becket at Canterbury; on which was founded his *Canterbury Tales*.

**TABAREK,** a town of Persia, in the province of Irak; 8 miles S.E. of Casbin.

**TABARIA,** or **TABERAYAN,** or *Tabarieh*, anciently *Tiberias*, a town of Palestine, situated on the west bank of a lake, called in the scriptures the "Lake of Gennesareth," and the "Sea of Tiberias," and at the foot of a high and sharp mountain; surrounded with walls, except towards the water. This town was built by Herod Antipas, to the honour of Tiberius, and was long the capital of Galilee, and after the destruction of Jerusalem, for some time the residence of the high priest. This city Herod was obliged to people mostly with Galileans and strangers, because it being built on a ground which was full of sepulchres, the going over which pollutes the Jews seven whole days, though he endowed it with considerable privileges, and gave its inhabitants the greatest encouragement, viz. lands to some, houses to others, to take off their qualms of conscience about treading on dead bodies. At the destruction of Jerusalem the town submitted to Vespasian, and received the Jews which escaped. In the year 1100, it was taken by the Christians under Godfrey; but in 1116, it was retaken by the Saracens, through the treachery of Raymond III. count of Thoulouse. During the time of Christianity it was the see of a bishop, suffragan of Nazareth. Near it are some warm baths. The Christians have a church here, and the Jews a seminary. In 1759, it suffered much by an earthquake; 16 miles S. of Safad.

**TABAS,** a town of Asiatic Turkey, in Natolia; 34 miles S. of Dignizlu.

**TABAS,** the ancient *Tabienne*, a town of Persia, in the province of Chorasan, situated in a range of hills, 337 miles from Herat and 150 from Yezd. It contains a population of about 20,000 persons, and carries on a trifling trade with Herat and Yezd.

**TABASCO,** a province of Mexico, bounded on the north by the gulf of Mexico, on the east by Yucatan, on the south by Chiapa, and on the west by Guaxaca, about 100 miles in length, but narrow. The climate is not reckoned healthy, nor is the soil remarkable for its fertility.

The

The inhabitants, however, have good farms well-stocked with cattle, which sell to good advantage. They have also great plenty of Indian corn and cocoa-nuts, which they send to Vera Cruz. Most of the country is flat and moist, has many marshes and lakes well-stocked with fish. It rains nine months out of the twelve, so that the air is excessively damp; and in February, March, and April, remarkably hot, when infinite swarms of gnats and other insects are produced. The coast, from the beginning of September to the end of March, is subject to tempestuous northerly winds, which render sailing dangerous during that season. The Spaniards brought hither vines, lemon, orange, and fig trees, which all thrive here very well. Here are large thickets of mangroves and bamboos, and woods of cedar, Brazil wood, &c. frequented by lions, tigers, wild bears, and deer. They have a great number of rabbits, apes, and squirrels, with the common fruits of America; and three or four harvests of maize in a year; besides rice, barley, and all sorts of garden-herbs, different species of European fowls, and others to us unknown. This province was accustomed to pay its tribute to the ancient kings of Mexico in chocolate.

**TABASCO**, a river of North America, which runs into the bay of Campeachy, N. lat.  $18^{\circ} 15'$ . W. long.  $93^{\circ} 40'$ . On the banks of this river are some of the largest cabbage and cotton trees supposed in the world.

**TABASCO**, a town of Mexico, and capital of a province, to which it gives name, called also by the Spaniards "Nuestra Señora de la Vittoria," from a great victory obtained here by Cortez, on his first arrival. It stands on an island, at the mouth of the river Grijalva, which divides itself near the sea into two branches, of which the western falls into the river Tabasco, which rises in the mountains of Chiapa; and the other continues its course till within four leagues of the sea, where it subdivides, and separates the island above mentioned from the continent. Near it are plains, which abound with cattle and other animals, particularly the mountain-cow, so called from its resembling that creature, and feeding on a sort of moss found on the trees near great rivers. The island of Tabasco, on which the town of that name is built, is about 12 leagues long and  $2\frac{1}{2}$  broad. The town is not very large, but well-built, and considerably enriched by a constant resort of merchants and tradersmen at Christmas. N. lat.  $18^{\circ} 20'$ . W. long.  $93^{\circ} 46'$ .

**TABASHEER**, in *Medicine*, a drug of high repute in many parts of the East, the knowledge of which has been communicated to the western world by the works of the Indian physicians, by all of whom it is mentioned as an important article in the *Materia Medica*; and it is still considered to be administered under this and other names in Turkey and in various parts of India. The Arabian medical writers generally agree, that the Tabasheer is a production of the Indian reed. The genuine Tabasheer, according to Dr. Patrick Russell (*Phil. Transf.* vol. lxxx. p. 275.) is undoubtedly a production of the *Arundo Bambos* of Linnæus; and the bamboo in which it is found, is vulgarly called the female bamboo, and distinguished by the largeness of its cavity from the male, employed for spears and lances. The bamboo, however, yields this drug only in a small quantity, varying according to the soil or situation in which the bamboo grows. For a farther account of it, we refer to the *Phil. Transf.* ubi supra. See **ARUNDO**.

**TABASO**, in *Ancient Geography*, a town of India, on this side of the Ganges, between Bynda and Pseudofiomus. Ptol.

**TABASSERAN**, in *Geography*, a district of the tract of land situated along the Caspian sea, between the rivers Terek

and Kur, and one of the divisions of the province of Daghestan, dependent on Persia. It lies between the Durbach and Rubas, towards their sources; extending about six German miles inland from above the territory of Derbent as far as the highest ridge of the Lefgian mountains, which is here very rocky and woody. Reineggs calculates the strength of the different tribes inhabiting Tabasseran, who, besides the Tartarian, speak another language peculiar to themselves, at about 10,000 families: and, according to him, the reigning family have held the sovereignty over the country for more than 600 years. See Reineggs' *General Historico-topographical Description of Caucasus, &c.* The town of Tabasseran is the residence of a prince, and the centre of the trade carried on between Persia and Daghestan.

**TABAXIR**, in *Botany*, pronounced *Tabasheer*, appears to be a Persian name, appropriated to the Bamboo, *Arundo Bambos* of Linnæus, or rather originally to an internal secretion of the stem of that plant. This is at first of a milky aspect, but subsequently concretes into a solid form, and very hard substance, compared to sugar, but more like sand or pebbles, being indeed a real siliceous earth. The discovery of its true nature was made by Mr. Macie, now Smithson, and published in the *Philosophical Transactions* for 1791, vol. viii. p. 368. See **ARUNDO**, and **TABASHEER**.

**TABAZET**, a word used by some writers to express highly-refined sugar.

**TABBAJEE**, in *Geography*, a town of Africa, in Neola. S. lat.  $13^{\circ} 32'$ . W. long.  $11^{\circ} 8'$ .

**TABBAY**, one of the Western islands of Scotland, near the east coast of Skye. N. lat.  $57^{\circ} 16'$ . W. long.  $5^{\circ} 51'$ .

**TABBY**, a mixture of stone and mortar, which becomes as hard as a rock, used in Morocco. The walls of the city are formed of this substance.

**TABBY**, in *Commerce*, a kind of thick silk, usually watered. It is manufactured like the common taffety, excepting that it is stronger and thicker both in the wool and warp.

The watering is given it by means of a calender, the rolls of which are of iron, copper, or wood, which, bearing unequally on the stuff, render the surface of it unequal, so as to reflect the rays of light differently.

**TABBYING**, or **WATERING**, the passing a stuff under a calender, to make the representation of waves on it as on a tabby. It is usual to tabby mohairs, ribbands, &c. Tabbying is performed without the addition of any water, or dye; and furnishes the modern philosophers with a strong proof that colours are only appearances.

**TABE**, in *Geography*, a river of Prussia, proceeding from the Niemen, and running into the Curisch-Haff.

**TABEA**, in *Ancient Geography*, a town of Asia Minor, in the Greater Phrygia. Strabo.

**TABEIPILLY**, in *Geography*, a town of Hindoostan, in Myfore; 25 miles W.N.W. of Bangalore.

**TABELLA**, or **TABLET**, *Tabularium*, in *Pharmacy*, a solid kind of electuary, or confection, made of dry ingredients, usually with sugar, and formed into little flat morsels, or squares, more usually called *lozenges*, and sometimes *morselli, troches, &c.*

Powders, fruits, salts, &c. are dissolved with sugar, and made into *tabula*, as those of the juice of liquorice for colds, &c.

We have *cordial, stomachic, aperitive, and hepatic* tablets. Jellies and broths are sometimes reduced into a sort of tablets, to be carried in the pocket, and called *pocket-soup*. *Tabella manus Christi* are made of sugar of roses pearled. *Tabella magnanimitatis* are a sort taken by feeble old men,

when matched with young wives, to assist them in the affair of generation.

**TABELLE Votive**, in *Antiquity*, a name given to certain tablets, which were hung up in the temples: for, according to an ancient custom, which prevailed all over Greece, such as recovered from any distemper used to write in a tablet the nature and symptoms of their respective maladies, and the remedies which had been most successful. These tablets Hippocrates is said to have copied and followed when he first began to practise: and, if we believe Pliny (lib. vii. c. 37.), he learned from these the first rudiments of physic.

A tablet of this nature was discovered at Rome, not many years ago, among the ruins of the ancient temple of Æsculapius, with this inscription in Greek. Julianus being afflicted with vomiting of blood, and abandoned by men, the gods hastened to his relief, and having nourished him for the space of three days with honey, restored him to his health: for which favour he came to return them thanks in the presence of the people. Tables of a similar kind, under the same denomination, were hung up in the temples by those who had escaped shipwreck, &c.

**TABELLIO, TABULARIUS**, in the Roman law, a *scrivener*; a kind of officer often confounded with the notary, *notarius*: yet the two differed in this; that the notaries only drew up and kept the minutes of acts and instruments on paper, and in notes, or short-hand; whereas the tabelliones delivered them engrossed fair, on parchment, in the full executory form. The same also put the seals to contracts, and rendered them authentic.

The domestic clerks of these tabelliones, who at first wrote under them, in process of time came to be called *notaries*.

Pasquier observes, that the tabelliones at Rome were public slaves, appointed for the keeping of contracts made between private persons. According to Loysseau, a contract written by a notary was not perfect, or obligatory, till the tabellio had written it fair: after which, the parties subscribed it, *i. e.* they wrote at bottom, that they approved the contents; for signatures were not then in use. See **SIGNATURE**.

“Quoniam tabellionum usus in regno Angliæ non habetur, propter quod magis ad sigilla authentica credi est necesse, ut eorum copia facilius habeatur, statuimus, ut sigillum habeant non solum archiepiscopi, et episcopi, sed eorum officiales.”

**TABENNE**, in *Geography*, an island in the river Nile, between Dendera and the ruins of the ancient Thebes; famous on account of the retreat of the monk Pacomius and several hundred of his brethren.

**TABENUS CAMPUS**, in *Ancient Geography*, a country of Asia Minor, on the confines of Phrygia and Mysia. Strabo.

**TABERG**, in *Geography*, a town of Sweden, in the province of Smoland, situated on a mountain of the same name, which abounds in iron-ore; 2 miles S. of Jonkioping.

**TABERISTAN** See **MAZANDERAN**.

**TABERN**, in *Rural Economy*, a term sometimes applied to a cellar, or other similar excavation, for the containing of liquor of the domestic kind.

**TABERNA MERITORIA**, among the Romans, Mars' hospital, or a place where disabled soldiers were maintained at the charge of the government.

**TABERNACLE, TABERNACULUM, q. d. a tent**; among the Jews, was a kind of moveable chapel, so contrived as to be taken to pieces, and put together at pleasure, for the convenience of carrying it from place to place, during the migration of the Israelites in the wilderness for forty years.

It was erected by Moses, in consequence of the express command of God, partly to be a palace of his presence as the king of Israel, and partly to be the medium of the most solemn public worship, which the people were to pay to him. It was erected on the first day of the first month of the second year after the Israelites' exodus from Egypt. Exod. xl. 2. 17. 26. 29. 34. 35.

The tabernacle was of a rectangular figure, thirty cubits long, ten broad, and ten high; or, according to Dr. Cumberland's reduction to English measure, fifty-five feet long, eighteen broad, and eighteen high. The two sides and one end were composed of broad boards, standing upright; each board being about two feet nine inches broad, fastened at the bottom by two tenons in each board, fitted into two mortises on the foundation; at the top by links or hasps, and on the sides by five wooden bars, which run through rings or staples in each of the boards. Each side consisted of twenty of these boards, and the end of eight. Both the boards and bars were overlaid with gold; and the rings and hasps were of the same metal. The foundation, on which they stood, consisted of solid blocks of silver, two under each board; each of which was about sixteen inches long, and weighing a talent, or about an hundred weight. The number of these blocks was about an hundred; ninety-six of which were laid under the forty-eight boards, and the other four were the bases of the columns that supported the veil or curtain, which divided the inside of the tabernacle into two rooms. Hence some have derived the ancient fashion of setting porphyry columns on bases of white marble.

The tabernacle had four different coverings, or carpets, thrown over one another. The first and lowest was made of fine linen, richly embroidered with figures of cherubims, in shades of blue, purple, and scarlet: and consisted of ten breadths, which were joined together with blue loops and clasps of gold. The next over this was made of a sort of mohair, the breadths of which were joined with clasps of brass. The third carpet was made of ram's skin dyed red; and the uppermost of all was made of *sachafsb*, *i. e.* as has been generally supposed, badger's skins.

The east end of the tabernacle had no boards, but was sheltered with a fine embroidered curtain, hung upon five pillars of Shittim wood, overlaid with gold, and supposed by Philo to touch the ground.

The inside of the tabernacle was divided into two rooms, by means of a veil or curtain, hung upon four pillars; the veil was curiously manufactured of the richest stuff, and adorned with cherubims and other ornaments, embroidered upon it. By this veil the tabernacle was divided, and learned writers have reasonably conjectured, in the same proportion with the temple, afterwards built according to its model: that is, two-thirds of the whole length were allotted to the first room, and one-third to the second; so that the room beyond the veil, which was called the *holy of holies*, was exactly square, being ten cubits each way: and the first room, called the *sanctuary*, was twice as long as broad.

Round the tabernacle there was a spacious court, one hundred cubits long, and fifty broad, surrounded with pillars set in bases of brass, and filleted with silver, at the distance of five cubits from one another. The chief things in this court were the altar of burnt-offering, and the brazen laver. See Exod. ch. xxviii. and ch. xxx.

In the sanctuary, or first room of the tabernacle, were the altar of incense (Exod. xxx. 1—10.), the golden candlestick (Exod. xxv. 31, &c.) valued by Cumberland at upwards of five thousand and seventy-six pounds sterling, and the table of shew-bread, described Exod. xxv. 23—30. Within the second veil, in the holy of holies, was the ark of

testimony, and its lid or cover, called the *mercy-seat*, described Exod. xxv. 10—21. See *ARK of the Covenant*.

The learned Spencer (De Leg. Hebr. diff. i.) suggests, that Moses projected the tabernacle, with its furniture and appurtenances, after the fashion of a similar structure, which he had observed in Egypt, and which was in use among other nations; or, at least, that God directed it to be made with a view of indulging the Israelites in a compliance with their customs and modes of worship, so far as there was nothing in them really sinful: and he alleges evidence of such portable temples among the heathens, in which they deposited the most valuable sacred or religious utensils. But it has been replied to this conjecture, that it is not probable. But, on the other hand, it should seem more likely, that the heathens took these things from the Jews, who derived the whole of their religion from God, than that the Jews, or rather that God should take them from the heathens: and, besides, the Jewish tabernacle was ordered to be directly the reverse of the heathen tabernacles, both in its form, which was capable of being taken to pieces, whereas theirs was carried about entire; and in its situation, which was accommodated to the people's worshipping towards the West; whereas it was the general practice of the heathens to worship with their faces towards the East. (See Ezek. viii. 16. and Virgil *Æneid*. xii. l. 172—174.) The value of the gold and silver only, used for the work of the tabernacle (Exod. xxxviii. 24, 25.), amounted, according to bishop Cumberland's reduction of Jewish talents and shekels to English coin, to upwards of one hundred and eighty-two thousand five hundred and sixty-eight pounds. Jennings's Jewish Ant. vol. ii. b. 2. c. 1. Anc. Univ. Hist. vol. i. part ii. p. 651, &c. folio.

We have also an account of two other tabernacles before the building of Solomon's temple, besides that above described. One of these was erected by Moses for himself; in which he gave audience, heard causes, and inquired of God; and, perhaps, also the public offices of religious worship were performed in it for some time; whence it was called the *tabernacle of the congregation* (Exod. xxxiii. 7.) The other was that which David erected in his own city, for the reception of the ark, when he received it from the house of Obbededom. 2 Sam. vi. 17. 1 Chron. xvi. 1.

TABERNACLES, *Feast of*. See SCENOPEGIA.

TABERNACLE is also used, of late, for a place of religious worship, appropriated to the use of those that are called Methodists.

TABERNACLE, in *Architecture*, an ornamented chest, generally made of precious wood, metal, or marble, and placed upon Roman Catholic altars, as a receptacle for the ciborium and pyxis.

TABERNACLE, in *Pointed Architecture*, a niche surmounted by a canopy of tracery work.

TABERNÆMONTANA, in *Botany*, was so called by Plumier, in memory of one of the fathers of modern botany, James Theodore, surnamed Tabernæmontanus, that being the latinized appellation of Berg Zabern, a town in the district of Deux-Ponts, where he was born. He died at Heidelberg in 1590, having published a ponderous and learned German *Kreuterbuch*, or Herbal, the wooden figures of which were subsequently printed by themselves, under the title of *Tabernæmontani Eicones*, in long quarto.—Linn. Gen. 118. Schreb. 165. Willd. Sp. Pl. v. 1. 1244. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 71. Swartz Ind. Occ. 535. Brown Prodr. Nov. Holl. v. 1. 467. Plum. Gen. 18. t. 30. Juss. 145. Lamarck Dict. v. 7. 527. Illustr. t. 170.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Contarte*, Linn. *Apocinea*, Juss. Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, small, in five acute converging segments, permanent. *Cor.* of one petal, valver-shaped; tube cylindrical, many times longer than the calyx, tumid at the base; limb horizontal, in five deep, oblong, obtuse, obliquely twisted segments, scarcely so long as the tube. Nectary of five cloven glands, surrounding the germen. *Stam.* Filaments five, small, inserted into the middle of the tube; anthers erect, arrow-shaped, converging, generally enclosed in the tube. *Pist.* Germens two, simple; style solitary, central, thread-shaped; stigma oblong, capitate, cloven, dilated at the base. *Peric.* Follicles two, horizontally spreading, tumid, pointed, each of one cell and one valve. *Seeds* numerous, ovate-oblong, obtuse, rugged, imbricated, imbedded in pulp.

Eff. Ch. Corolla valver-shaped; its limb obliquely twisted, in five deep segments. Anthers arrow-shaped, within the tube. Follicles two, tumid, divaricated. Seeds imbedded in pulp.

“A genus of shrubs, with opposite simple leaves. *Stipulæ* between the footstalks, connected below, loose above. *Cymes* somewhat forked. *Calyx* permanent.”—Brown, by whose remarks we have profited in some of the above characters. The species are all of tropical origin, and contain more or less of an acrid milky juice. The flowers are white or yellow, mostly fragrant and ornamental. Two North American herbaceous species, with alternate leaves, and blueish flowers, one of them, *T. Amsonia* of Linnæus, having a funnel-shaped corolla, and no pulp in the fruit, are well separated by Walter, Michaux, and other late writers, under the generic name of *Amsonia*.

1. *T. citrifolia*. Citron-leaved Tabernæmontana. Linn. Sp. Pl. 308. Willd. n. 1. Ait. n. 1. Jacq. Amer. 38. t. 175. f. 13. (*T. lactescens*, citri foliis undulatis; Plum. Ic. 246. f. 2. T. n. 1; Browne Jam. 182.)—Leaves elliptical, pointed. Panicles axillary, stalked, cymose, of few flowers.—Native of the West Indies. Jacquin observed it in Martinico; Browne in Jamaica. The French in the former island call it *Bois laiteux*, from the milky juice with which every part abounds. The stem is shrubby, erect, branched, from five to eight feet high, smooth like every other part. Leaves opposite, stalked, from four to six inches long, and from two to three and a half broad, of a fine shining pellucid green; paler beneath; wavy at the edges; furnished with a central rib, and many strong, curved, nearly opposite, transverse ones. Flowers white, with a light agreeable scent, in opposite, axillary, somewhat umbellate, stalked panicles, about twice or thrice the length of the footstalks. Jacquin describes the follicles as always green, acute, filled with soft orange pulp, enveloping the brown rugged seeds.

2. *T. laurifolia*. Laurel-leaved Tabernæmontana. Linn. Sp. Pl. 308. Willd. n. 2. Ait. n. 2. Jacq. Amer. 39. (*Nerium arboreum*, folio latiore obtuso, flore luteo minore; Sloane Jam. v. 2. 62. t. 186. f. 2.)—Leaves elliptical, bluntish. Panicles axillary, nearly sessile, cymose, smooth, shorter than the footstalks.—Native of banks of rivers in Jamaica. We have seen no specimen. Sloane describes this as a tree, whose trunk is as thick as one's leg, fifteen feet high, with long crooked branches, leafy at the end. The leaves appear to be rather less pointed than in the former, and of a darker green. Flowers yellow, very sweet-scented; the tube of their corolla half an inch only in length; in the first species it measures full an inch. The flower-stalks are smooth, not scaly. Linnæus erroneously refers Browne's plant to this species, on the authority of Solander, who marked the original specimen *T. laurifolia*.

3. *T. squamosa*. Scaly-stalked Tabernæmontana.—Leaves ovate,

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ovate, bluntish. Panicles from the forks of the branches, cymose, with scaly flower-stalks.—Gathered by Commerfon, in the island of Mauritius. The *branches* are round, forked, rough with minute white tubercles. *Leaves* three or four inches long, and two or three broad, very smooth, opaque, slightly wavy, with one rib, and many transverse veins, on smooth *footstalks* three quarters of an inch in length. *Panicles* in pairs from the forks of the branches, each cloven and somewhat subdivided, divaricated, of about ten apparently white or yellowish *flowers*; their partial stalks clothed with numerous, roundish, imbricated *bractæas*, gradually larger upward, which we have not seen in any other species. Tube of the *corolla* above an inch long; limb somewhat shorter, rough with glandular hairs, on the upper side, about the centre. We cannot refer this to any described species, even in Lamarek.

4. *T. odorata*. Fragrant Tabernæmontana. "Vahl Eclog. Amer. fasc. 2. 22." Poiret in Lamarek Dict. n. 17. (Cameraria Tamaquarina; Aubl. Guian. 260. t. 102. C. lutea; Willd. Sp. Pl. v. 1. 1244.)—*Leaves* elliptic-lanceolate, pointed, smooth and shining, on short stalks. Umbels from the forks of the *branches*, of about four flowers. Corolla slightly downy externally.—Found by Aublet, on the banks of rivers in Guiana, flowering in May. Vahl was induced by the remarks of Von Rohr to remove this plant hither. (See CAMERARIA, n. 3.) The *leaves* in Aublet's specimen are highly polished, about four inches long, and above one wide. *Partial flower-stalks* above an inch long, smooth, naked, simple. *Flowers* yellow, with a sweet pleasant smell; their limb longer than the tube, which measures about three quarters of an inch.

5. *T. echinata*. Prickly-fruited Tabernæmontana. Aubl. Guian. 263. t. 103. Willd. n. 3.—*Leaves* on short stalks, elliptic-lanceolate, pointed; somewhat downy beneath. Umbels dense, many-flowered, from the forks of the branches. Follicles mucronate.—Native of Guiana, flowering in August. The *stems* are numerous, knotty, four or five feet high. *Leaves* five or six inches long, and two broad, smooth and green above; clothed with a slight whitish down beneath. *Flowers* small, yellowish; their tube dotted with red. The *follicles* are ovate, deflexed, an inch long, covered with crowded soft tubercles. Aublet. We have seen no specimen. The author mentions no pulp in the seed-vessels.

6. *T. grandiflora*. Large-flowered Tabernæmontana. Linn. Mant. 53. Willd. n. 4. Jacq. Amer. 40. t. 31. Lamarek f. 2.—*Leaves* ovato-lanceolate, acute. Stem forked. Segments of the calyx unequal, very lax.—Found by Jacquin in woods at Carthage, but rarely, flowering from July to September. A *shrub* eight feet high, with forked divaricated, leafy *branches*. *Leaves* three or four inches long, tapering at each end, smooth and shining, on short stalks. *Flowers* large, inodorous, two or three together on a stalk, at the side of each uppermost fork of the branches. *Calyx* divided into five whitish, flat, ovate segments, very unequal in length, and loosely spreading, ill agreeing with the usual character of the genus; but the *fruit*, which is in this case much more important, is that of a *Tabernæmontana*. Its surface is smooth and green. Jacquin.

7. *T. cymosa*. Cymose Tabernæmontana. Linn. Mant. 53. Willd. n. 5. Jacq. Amer. 39. t. 181. f. 14.—*Leaves* ovato-lanceolate, acute. Cymes axillary, many-flowered. Stamens in the base of the tube. Follicles coloured, recurved, very obtuse.—Frequent in woods and bushy places at Carthage, flowering in July and August.—An elegant *shrub*, from six to fifteen feet in height. *Leaves* slightly wavy, half a foot long. *Cymes* large and handsome, convex,

dense, each of about forty dirty-white or reddish scentless *flowers*, the size of the first or second species. *Follicles* large, very blunt, red, spotted with brown; one of them generally abortive.

8. *T. obtusa*. Blunt-leaved Tabernæmontana.—*Leaves* obovate, obtuse. Panicles terminal, aggregate, forked, level-topped, many-flowered.—Gathered by Commerfon, in the isle of Bourbon. The *leaves* are three or four inches long, flat, smooth and shining, with fine close transverse veins; very obtuse, and often emarginate at the extremity; tapering at the base into a *footstalk* about an inch in length. *Panicles* three, in our specimen, at the end of the branch, on stalks, nearly equal to the adjoining leaves, repeatedly forked, consisting of numerous yellow *flowers*, smaller than in most of the foregoing. We know nothing of the *fruit*.

9. *T. amygdalifolia*. Almond-leaved Tabernæmontana. Jacq. Amer. 39. t. 181. f. 15.—*Leaves* oval-lanceolate, acute, smooth and shining. Anthers projecting out of the tube.—Frequent in woods and thickets at Carthage. A branching milky *shrub*, six feet high. *Leaves* flat, highly polished. *Flowers* but few on a stalk, white, powerfully scented. *Filaments* in the upper part of the tube, so that their anthers project above the orifice, in the form of a pointed cone. *Follicles* pointed, green and shining, resembling those of *T. citrifolia*, but scarcely half, or one-third, so large; their pulp orange. When this shrub begins to flower, it is mostly without leaves. Jacquin.

10. *T. discolor*. Two-coloured Tabernæmontana. Swartz Ind. Occ. 535. Willd. n. 7. Poiret in Lamarek n. 3.—*Leaves* elliptic-lanceolate, smooth, tapering at each end. Stalks two-flowered, terminal, thread-shaped.—Native of bushy places in Jamaica. Swartz. The *stem* is six feet high, with smooth, opposite *branches*, quadrangular when young, leafy at the ends. *Leaves* two or three inches long, stalked; dark green above; pale beneath. *Footstalks* bordered, about half an inch in length. *Flower-stalks* very slender, smooth, one and a half or two inches long, divided rather below the middle, and bearing two whitish or yellowish *flowers*, with one or two straggling *bractæas*. Tube of the *corolla* half an inch long; limb shorter. The *inflorescence* is terminal in Dr. Swartz's own specimen, as he describes it; and yet it is called axillary in the specific character; perhaps because it is, as in other species, closely attended by leaves.

11. *T. multiflora*. Many-flowered Tabernæmontana.—*Leaves* elliptic-lanceolate, smooth, pointed. Stalks lateral and terminal, many-flowered, thread-shaped, corymbose.—Gathered by the late Mr. Christopher Smith, in the isle of Banda. This much resembles the last in general habit, though the leaves are somewhat larger, with an oblong obtuse point, and more reticulated beneath. The *flowers* too are rather larger, and differ essentially in composing ample, repeatedly subdivided, corymbose *panicles*, about the ends of the branches, accompanied here and there by very minute, scattered, scale-like *bractæas*. The *corolla* seems flesh-coloured in the dried specimen, with long slender segments; its tube an inch long.

12. *T. undulata*. Wave-leaved Tabernæmontana. "Vahl Eclog. Amer. fasc. 2. 20." Poiret in Lamarek n. 5.—*Leaves* lanceolate-elliptical, pointed, undulated, smooth, nearly sessile. Branches forked. *Flowers* somewhat cymose. Follicles smooth.—Native of South America, and the island of Trinidad. The *leaves* are five or six inches in length, tipped with a long point; contracted at the base; bright green above; pale and yellowish beneath. *Flowers* three or four together, in small, solitary, axillary

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or terminal, cymose clusters. Tube an inch long. Follicles an inch and a half in length, reflexed, even, rather pointed. We have no knowledge of this species, or of the two following, but from the authors quoted.

13. *T. heterophylla*. Various-leaved Tabernæmontana. "Vahl Eclog. Amer. fasc. 2. 22." Poiret in Lam. n. 7.—Leaves elliptic-lanceolate; partly somewhat heart-shaped, pointed, rather wavy, smooth. Branches forked. Flowers racemose."—Native of Cayenne. The leaves immediately under the forks of the branches are lanceolate, three or four inches long, and moderately stalked: the rest are sessile, much shorter, and almost heart-shaped. The flower-stalks are solitary, in the forks as well as at the summits of the branches, smooth and slender, each bearing from five to seven flowers, whose corolla is half an inch long, with some silky hairs about the mouth. Vahl.

14. *T. Pandacaqui*. Pandacaqui Tabernæmontana. Poiret in Lam. n. 8. (Pandacaqui; Sonnerat Nouv. Guin. 49. t. 19.)—Leaves elliptic-lanceolate, smooth, with a blunt point. Panicles axillary, corymbose, many-flowered, half as long as the leaves.—Native of the Philippine islands, where it was found by Sonnerat. He says the natives of the isle of Luçon apply the milk of this shrub to their wounds. The stem is four or five feet high. Leaves two or three inches long, smooth, even, and quite entire, on short stalks. Flowers white; their tube an inch long; limb scarcely half that length. He did not see the fruit. The younger Linnæus most unaccountably referred this plant, in the Supplement, to *Chiococca racemosa*, with which it accords as little as can well be. It is now, on Jussieu's authority, removed to the present genus; and as he speaks decisively on the subject, Gen. Pl. 145, we presume he was acquainted with the follicles.

15. *T. persicariaefolia*. Knot-grass-leaved Tabernæmontana. Jacq. Coll. v. 4. 139. Ic. Rar. t. 320. Willd. n. 8. Poiret in Lam. n. 9.—Leaves lanceolate, smooth, tapering at each end. Corymbs from the forks of the branches, in pairs, divided.—Native of the island of Mauritius. The stem is shrubby, erect, slender, repeatedly branched. Leaves four or five inches long, more or less tapering at the end, dark green, shining, with a white rib and veins; their margin slightly undulated. Footstalks hardly an inch in length. Flowers yellowish-white; their tube and limb each measuring nearly an inch. We have from Commerçon a specimen collected in the island above-mentioned, which answers to Jacquuin's description and figure, except the leaves being less elongated; but it can scarcely be more than a variety. Another from the isle of Bourbon would appear to be the same plant, but its inflorescence is lateral, from the bosoms of the leaves, not from the forks of the branches. Still we dare not describe this as a separate species.

16. *T. neriifolia*. Oleander-leaved Tabernæmontana. "Vahl Eclog. Amer. fasc. 2. 21." Poiret in Lam. n. 10.—Leaves lanceolate, smooth, veinless, acute at each end. Clusters axillary, solitary, of few flowers. Limb of the corolla downy about the mouth. Stamens prominent.—Native of Porto-Rico. Allied to the last. Leaves two or three inches long, scarcely wavy at the margin; paler beneath; marked with a few fine lateral distant ribs. Footstalks half an inch long. Clusters twice the length of the footstalks, each of three or four flowers, with a small, linear, deciduous bractea to each of their short partial stalks. Corolla about half an inch long, with wedge-shaped segments, a little downy on their inner side towards the base. The stamens, (we presume the anthers only,) project out of the tube. Vahl. The specific character given by this author

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being quite insufficient, we have ventured to enlarge it from his description, without seeing the plant.

17. *T. mauritiana*. Brittle Tabernæmontana. Poiret in Lam. n. 11.—Leaves ovate, obtuse, membranous; scarcely downy beneath. Clusters axillary, of few flowers. Branches with brittle joints.—Gathered by Commerçon in the island of Mauritius, and by Sonnerat in the East Indies. We find no specimen in our collection answerable to Poiret's description. He says the plant is remarkable for its woody, cylindrical, striated, smooth branches being jointed at the insertion of the leaves, and very brittle at those joints; bearing very small, oval, whitish tubercles. Leaves thin, membranous, oval, obtuse, rounded at each end, entire, a little wavy at the edges, three or four inches long, and two and a half wide; green and rather shining above; paler beneath, and very soft to the touch, but hardly pubescent; having one stout yellowish mid-rib, with fine parallel transverse veins. Footstalks thick, from six to eight lines in length. Clusters short and nearly simple, towards the ends of the branches, a little drooping. Corolla yellowish-white; its tube three or four lines long; limb short and obtuse. Fruit not examined. Poiret.

18. *T. Sananho*. Sananho Tabernæmontana. "Ruiz and Pavon. Fl. Peruv. v. 2. 22. t. 144." Poiret in Lam. n. 12.—Leaves oblong, pointed, smooth, somewhat wavy. Corymbs with four or five branches. Bracteas inversely heart-shaped. Follicles roundish-obovate, pointed.—Native of the extensive forests of Peru, flowering in August and September. A shrub twelve or fifteen feet high, or more, with smooth cylindrical branches. Leaves six or eight inches long, stalked, shining, somewhat veiny. Flowers yellowish-white, lateral and terminal, from fifteen to twenty in each corymb. Corolla large, with a very long angular tube. Follicles the size of an apricot, of a dirty white, containing many brown striated seeds lodged in pulp. Poiret.

19. *T. arcuata*. Curve-fruited Tabernæmontana. "Ruiz and Pavon Fl. Peruv. v. 2. 22. t. 143." Poiret in Lam. n. 15.—Leaves obovate-oblong, pointed, entire, on short stalks. Corymbs axillary, ternate, many-flowered. Follicles recurved.—Common in the great forests of Peru, about Pozuzo, flowering in November and December. A tree, thirty or forty feet high, discharging, when wounded, a very copious milky juice, which hardens in the air into a gum-resin of a brown hue. The branches form an ample leafy head, and are forked, pale, slightly compressed. Leaves eight or nine inches long, on short, rather twisted, stalks. Flowers yellowish-white, with small, oval, pointed bracteas. Follicles oblong, thick, three inches in length, reddish, full of red wrinkled seeds, in a crimson pulp.

20. *T. fasciculata*. Cluster-flowered Tabernæmontana. Poiret in Lam. n. 14.—Leaves oval-lanceolate, pointed, smooth, ribbed. Clusters axillary, somewhat umbellate, many-flowered. Segments of the corolla linear. Branches jointed.—Native of Cayenne. Seen by Poiret in Lamarck's herbarium. He describes the branches as very brittle at the insertion of the leaves, which are stalked, two or three inches long, an inch or more in width, rather obtuse, though pointed; shining above, reddish beneath. Flowers plentiful about the ends of the branches, in short, tufted, inclined corymbs, whose ramifications are somewhat forked and jointed, with little short deciduous bracteas. Tube of the corolla but two or three lines long; limb in five narrow, linear, obtuse segments. Fruit unknown. If it should prove muricated, Poiret thinks this species may not differ much from *T. echinata* of Aublet. See species 5.

C

21 T.

## TABERNÆMONTANA.

21. *T. coronaria*. Garland Tabernæmontana. Ait. n. 3. Roxburgh MSS. (*Nerium coronarium*; Willd. Sp. Pl. v. t. 1236. Jacq. Ic. Rar. t. 52. *N. divaricatum*; Linn. Sp. Pl. 306. Willd. *ibid.* *Jasminum zeylanicum*, folio oblongo, flore albo pleno odoratissimo; Burm. Zeyl. 129. t. 59. Nandi-ervatam; Rheede Hort. Malab. v. 2. 105. 107. t. 54, 55.)—Leaves elliptical, pointed, smooth. Stalks forked, corymbose, from the forks of the branches, as long as the leaves.—Native of the East Indies, in a sandy soil, flowering two or three times in a year. It is said to have been introduced into the English Isles by the late Mr. Gordon, in 1770. This plant blooms at various seasons, and is ornamental as well as fragrant, though inferior in both respects to the *Gardenia florida*, with which some of its synonyms have been confounded. Its genus is now more correctly determined in the second edition of Hort. Kew. than in the first; but a faulty specific character still remains, taken (as it seems) from Jacquin's plate, which exhibits a weak imperfect specimen. The stem is shrubby, bushy, smooth, three or four feet high, with copious forked spreading branches. Leaves two or two and a half inches long, paler beneath, on channelled footstalks half an inch in length. The corymbs, in various wild or cultivated, single or double-flowered, specimens before us, consist of from three to six cream-coloured flowers, and are elevated on a stalk, an inch and a half long, always solitary, from the forks of the branches. The single corolla has a rather slender tube, an inch long, with broad segments to the limb, about the same length; but in a double state both parts are much enlarged and thickened.

Mr. Brown has determined the *Nerium divaricatum* of Linnæus, erroneously marked as biennial, to be the same plant with the above. We shall now proceed to enumerate three new species from his *Prodromus*.

22. *T. orientalis*. Smooth Indian Tabernæmontana. Brown n. 1.—“Leaves lanceolate-oblong, pointed, very smooth, as well as the branches. Cymes repeatedly compound, smooth. Bractæas awl-shaped, not soon deciduous.”—Gathered in the tropical part of New Holland, by Mr. Brown, who suspects the *Curutu-Pala*, Hort. Malab. 83. t. 46, cited by Linnæus for his *T. alternifolia*, see our 25th species, may belong to the present plant, the leaves being erroneously represented as alternate.

23. *T. pubescens*. Downy New Holland Tabernæmontana. Br. n. 2.—“Leaves elliptic-oblong, somewhat pointed, downy beneath like the young branches. Branches of the cymes erect, hairy as well as the calyx. Bractæas very minute, deciduous.”—Native of the tropical part of New Holland. *M. R. Brown*.

24. *T. cbracteata*. Naked-flowered Tabernæmontana. Br. n. 3.—“Leaves somewhat elliptical, downy as well as the cymes. Branches and flower-stalks spreading. Bractæas none.”—Found by Mr. Brown in the same country as the two last. We have seen no specimens of any of these three species.

25. *T. alternifolia*. Alternate-leaved Tabernæmontana. Linn. Sp. Pl. 308. Willd. n. 10. Poiret in Lam. n. 20. (*Curutu-Pala*; Rheede Hort. Malab. v. 1. 83. t. 46.)—Leaves scattered, ovato-lanceolate.—Native of sandy ground on the coast of Malabar, flowering all the year, but especially in the rainy season. A small tree, from six to twelve feet high, a foot in diameter. The leaves are three or four inches long, pointed, on short thick footstalks, more or less alternate, or dispersed, according to the figure, which is our only authority for that character. Panicles lateral or terminal, corymbose, drooping, of about size white fra-

grant flowers, whose tube is near two inches long, the limb dilated and notched, very much twisted. Follicles tawny, ovate, an inch long, with a recurved point. Linnæus depended solely on the Hortus Malabaricus for this species, of which he had no specimen. The circumstance of the alternate leaves, unexampled in any known *Tabernæmontana*, has excited a reasonable suspicion of error. See our 22d species.

26. *T. bufalina*. Buffalo-horned Tabernæmontana. Loureir. Cochinch. 117. (*Capficum sylvestre*; Rumph. Amboin. v. 4. 133. t. 67.)—Leaves lanceolate, smooth. Stalks lateral, in pairs, single-flowered, pendulous.—Native of moist shady vallies in Amboina, and of bushy places in Cochinchina, where it is called *Cây sùng trâu*. A shrub five feet high, branched, nearly erect. Leaves opposite, from five to eight inches in length, ovato-lanceolate, shining, entire. Flowers white, on long simple stalks. Tube long and slender, inflated at the base. Follicles rather long, pointed, swelling, smooth, with an unequal surface. Seeds oblong, angular, imbedded in red pulp. The fruit in Rumphius's plate is more like the following. *Loureiro*.

27. *T. bovina*. Bull-horned Tabernæmontana. Loureir. Cochinch. 118. (*Cây sùng bò* of the Cochinchinese.)—Leaves lanceolate, smooth. Stalks axillary, solitary, nearly erect, about five-flowered.—Native of the plains of Cochinchina. A shrub four feet high, with drooping branches. Leaves opposite, entire. Flowers white. Follicles short, recurved, tumid, pointed, even in the surface. Seeds roundish, angular, lodged in red pulp.

Loureiro, from whose work and that of Rumphius all our knowledge of the two last species is derived, attributes to them an emollient and relaxing quality. Their viscid milky juice is said gently to draw out thorns from the flesh.

The herbaceous plants, supposed by Linnæus to belong to this genus, constitute, as we have already said, and as Linnæus himself originally thought, a very distinct one, of which we shall now treat by the name of *Amsonia*. We can give no positive account of the meaning or origin of this name, except that its author, according to Miller, was Clayton. Linnæus, in his own copy of Gronovius's *Flora Virginica*, ed. 1. p. 26, has written *Amsonia*, as a generic name, to what Clayton took for a species of *Nerium*, and has subjoined also in manuscript the characters of the follicles and seeds. This plant, in the second edition of Sp. Pl. is the *Tabernæmontana Amsonia*; and so it remained, till Mr. Walter restored it to rank as a genus; but without throwing any light upon the name. A similar obscurity envelopes the nearly similar name of *AMASONIA*, (see that article,) which is reported in the Supplementum of Linnæus to be dedicated to the honour of Amason, a traveller in America, whom M. De Theis has baptized Thomas. But we have never been able to learn any tidings of such a person. Whether *Amsonia*, being an error in orthography for *Ansonia*, may have been designed to commemorate the great lord Anson, who brought home a new esculent pea, and deserved botanical commemoration as much as any other eminent navigator not a professed botanist; and whether *Amasonia* be a still further corruption of the same name, we must leave in doubt. We have only to observe, that if both these names should prove to have the same origin, or be thought, as they certainly are, too nearly alike, the former, *Ansonia*, ought to be retained in preference to the latter, which is of much later date.

*AMSONIA*. Walter Carolin. 58. Michaux Boreale Amer. v. 1. 121. Pursh 184. Ait. Hort. Kew. v. 2. 72.

—Clafs

## TABERNÆMONTANA.

—Class and order, *Pentandria Monogynia*. Nat. Ord. *Con-  
toria*, Linn. *Apocinea*, Juss. Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, small, in five deep, acute, triangular, spreading segments, permanent. *Cor.* of one petal, funnel-shaped; tube many times longer than the calyx, gradually swelling upwards, hairy in the throat; limb about as long as the tube, in five deep, lanceolate, variously spreading, oblique segments. Nectary of five minute glands, surrounding the germen. *Stam.* Filaments five, small, inserted into the upper part of the tube; anthers erect, arrow-shaped, converging, within the tube. *Pist.* Germens two, simple, ovate; style solitary, central, thread-shaped, about as long as the tube; stigma oblong, obtuse. *Peric.* Follicles two, erect, long, cylindrical, pointed, destitute of internal pulp. *Seeds* numerous, pointed, rough, naked, abrupt and oblique at the point.

Eff. Ch. Corolla funnel-shaped; its limb in five deep oblique segments. Anthers arrow-shaped, within the tube. Follicles two, cylindrical, erect. Seeds cylindrical, naked.

1. *A. latifolia*. Broad-leaved Amfonia. Michaux n. 1. Pursh n. 1. Ait. n. 1. (*Tabernæmontana Amfonia*; Linn. Sp. Pl. 308. Willd. Sp. Pl. v. 1. 1246. *Apocynum virginianum erectum, alternis asclepiadis foliis, floribus pallidè cæruleis, radice crassâ*; Pluk. Almag. 35. Phyt. t. 115. f. 3.)—Stem smooth. Leaves ovato-lanceolate; slightly hairy beneath. Panicle taller than the lateral branches. Limb of the corolla ascending.—Native of shady wet woods in Carolina, flowering in May. *Pursh*. Cultivated by Miller in 1759, and hardy in our climate. The root is fleshy, perennial. *Stem* herbaceous, erect, a foot high, round, leafy, nearly or quite smooth, terminated by a compound smooth panicle of greyish-blue scentless flowers, and bearing two or three alternate leafy branches, which do not rise above the panicle till the flowers are past. *Corolla* very hairy about the mouth; its tube pale, nearly half an inch long. The leaves are all alternate, on short footstalks, entire, pointed, two or three inches in length, and one in breadth; paler beneath, and minutely hairy about the edges and veins.

2. *A. triflis*. Brownish-flowered Amfonia.—Stem smooth; its branches overtopping the panicle. Leaves ovate; slightly hairy beneath. Limb of the corolla reflexed.—Brought from North America, by Mr. Lyon. We received a specimen in flower, in June 1808, from Mr. Vere's garden, at Knightsbridge. This is rather taller than the foregoing, and distinguished by its leafy lateral branches rising high above the panicle. The flowers are smaller, of a dingy brown hue; the segments of their limb strongly reflexed, at least in fading. *Follicles* smooth, cylindrical. Perhaps Mr. Walter might have this species in view when he attributes tawny flowers (*flores fulvi*) to his *A. ciliata*, our 4th species.

3. *A. salicifolia*. Willow-leaved Amfonia. Pursh n. 2.—“Stem smooth. Leaves linear-lanceolate, acute at each end, very smooth.”—Gathered by Mr. Lyon in Carolina and Georgia, flowering in May. *Flowers* the same as the first species, more abundant. *Pursh*.

4. *A. angustifolia*. Narrow-leaved Amfonia. Michaux n. 2. Pursh n. 3. Ait. n. 2. Ventenat. Choix. t. 29. (*A. ciliata*; Walter n. 2. *Tabernæmontana angustifolia*; Willd. Sp. Pl. v. 1. 1247.)—Stem downy. Leaves linear, erect, fringed.—In sandy barren ground of Carolina and Georgia, flowering in May and June. *Flowers* of the same disposition and colour as in *A. latifolia* and *salicifolia*. *Pursh*. This species is said to have been introduced into the English gardens, in 1774, by the late Mr. James Gordon. Its copious narrow leaves are glaucous beneath, and smooth, except at the edges, where they are fringed with long soft

hairs, such as clothe the stem. Ventenat says the upper ones are quite smooth, but this is not the case in our specimen. The teeth of the calyx are sometimes tipped with a tuft of hairs. Walter says the flowers are tawny; others describe them, as we find them, like those of *A. latifolia*, blue, with a pale, or somewhat tawny, tube. The follicles of all the species, as far as we have seen, are slender, cylindrical, and smooth, about two inches long.

TABERNÆMONTANA, in *Gardening*, contains plants of the woody, exotic, and hardy perennial kinds, among which the species chiefly cultivated for garden purposes are, the citron-leaved tabernæmontana (*T. citrifolia*); the laurel-leaved tabernæmontana (*T. laurifolia*); the Virginian tabernæmontana (*T. amfonia*); and the narrow-leaved tabernæmontana (*T. angustifolia*).

These are all plants of the more tender and delicate kind, but more especially the two first sorts, which require the constant aid of artificial heat in this climate.

*Method of Culture*.—All these plants may be increased by seeds, which must be procured from the countries where the plants grow naturally, and be sown early in the spring on a hot-bed; and when the plants are come up, and fit to remove, be carefully planted out into small pots filled with light rich earth, and then plunged into a hot-bed of tanners' bark, being careful to shade them in the heat of the day, until they have taken new root; after which they should have free air admitted to them every day when the weather is warm; but on cold nights have the glasses of the hot-bed covered with mats every evening, soon after the sun goes off from the bed: they must be often refreshed with water, but not in large quantities, especially while they are young, as they are full of a milky juice, and are subject to rot with much moisture: they may remain during the summer season in the hot-bed, by stirring up the tan to renew the heat when it wants it, and a little new tan being added; but when the nights begin to be cold, the plants should be removed, and plunged into the bark-bed in the stove, where, during the winter season, they must be kept in a moderate degree of warmth, and in cold weather have but little water given them: they should constantly remain in the stove, where, in warm weather, they may have free air admitted to them by opening the glasses, but in cold weather be kept in a warm state. With this management they thrive and produce flowers; and, as their leaves are always green, make a pleasant diversity among other tender exotic plants: they may be increased likewise by cuttings in the summer season, which should be cut off from the old plants, and laid to dry in the stove five or six days before they are planted, that the wounded parts may heal over: these should then be planted in pots filled with fresh light earth, and be plunged into the hot-bed of tanners' bark, and closely covered with a hand-glass, shading them from the sun in the middle of the day in hot weather, refreshing them now and then with a little water: when they have taken root, they may be planted out into separate pots, and be treated in the same manner as those raised from seeds are recommended to be.

It may be noticed, that the third and fourth sorts are capable of living in the open air here, provided they are planted in a warm situation: they love a light soil, rather moist than otherwise; of course, when planted in dry ground, they should be frequently watered in dry weather. They are best increased by offsets from the roots, which should be planted out in the autumnal season.

Among these, the two first sorts afford variety in the stove, and the latter sorts in this as well as the borders in mild climates.

**TABERNEMONTANUS**, JAMES THEODORE, in *Bio-graphy*, a physician and botanist, was born at Berg-Zabern, in Alsace, and having practised as an apothecary, and acquired some knowledge of botany, went to France, where he took the degree of M.D. Advancing in his profession, he became first physician to the Elector-Palatine, the bishop of Spire, and other persons of rank. He died at Heidelberg, whither he had removed from Worms, in the year 1590. Apprehending that Providence had furnished every country with remedies suitable to its diseases, he confided much in the efficacy of herbs; and particularly in the powder of mugwort. His German Herbal consists of three volumes, published separately in the years 1558, 1590, and 1592, and containing figures, copied either by himself or others from nature. This work was well received, and has been often reprinted. He also published in German a treatise on baths and mineral waters. Haller. Eloy. Gen. Biog.

**TABERNAS**, in *Geography*, a town of Spain, in the province of Grenada; 15 miles N.N.E. of Almeria.

**TABERNE**, a town of Kurdistan; 50 miles E.S.E. of Kerkuk.

**TABES**, in *Ancient Geography*, a town of Asia, in the mountains of Parætacène, upon the frontiers of Persia and Babylonia. Strabo and Quintus Curtius.

**TABES**, in *Medicine*, a wasting or consumption of the body, accompanied with hectic fever. The distinction which nosologists have made between tabes and atrophy, is founded on the presence of hectic fever in the former, and its absence in the latter form of disease. Such a definition of tabes, however, would comprehend phthisis, a term which is generally restricted to that species of consumption which has its origin in diseases of the lungs. (See CONSUMPTION.) The ground of the distinction between tabes and atrophy, has already been fully discussed under the head of **ATROPHY**: and the train of symptoms constituting the fever that accompanies tabes, is sufficiently detailed under the article *Hectic Fever*. Dr. Cullen has enumerated three species of tabes; the first, which he calls the *purulent*, arising from suppuration, either of an internal or external part, and the seat of which may be various, according to the organ originally diseased; the second, the *serofulous*, being the consequence of serofula affecting different parts, but more especially the mesenteric glands; and the third, the *venenata*, proceeding from the operation of a poisonous substance received into the body. The other affections which had been classed by Sauvages under tabes, such as the tabes dorsalis, nutricium, sudatoria, a sanguifluxu, syphilitica, and a hydrope, are referred by Dr. Cullen to the genus **ATROPHY**; which see.

**TABES Dorsalis**, a species of consumption arising from the excessive evacuation of semen: its symptoms and treatment are detailed under **ATROPHY**.

**TABES Mesenterica**, or mesenteric consumption, is a disease that more particularly affects children, and arises from obstruction and enlargement of the mesenteric glands. Children are liable to its attacks from the age of three or four years, and become less so when they have attained that of eight or ten, unless they are of serofulous habits, in which case the disease may supervene at a much later period. Its relation to serofula is clearly marked, from its more frequent occurrence in families where this disease is hereditary: but it may, at the same time, arise independently of that affection, from a great variety of causes. It may be induced by any protracted disease of infancy producing much constitutional disturbance, and more especially by such as are attended with disorder of the functions of the alimentary canal. It may often be traced to improper treatment, or unwholesome food; to long-continued irritation from teething; to

the suppression of eruptions, or the incautious stopping of diarrhœa; and sometimes appears to be the consequence of exanthematous fevers, as the measles, small-pox, or scarlatina. The presence of worms in the intestines, has very frequently been accused of laying the foundation of this disease: but it may be questioned, whether they are not more generally the consequence than the cause of derangement in the primæ viæ attendant on this disorder.

The symptoms which attend the early stages of this affection, and before the enlargement of the glands has become sensible, are similar to those which accompany many of the diseases of the alimentary canal, more especially those produced by worms, and can hardly be distinguished from them. Indigestion occurs in various degrees, denoted by the usual signs, such as acid eructations, fetid breath, great irregularity in the action of the bowels, and in the appearance of the stools; occasional fever, occurring, however, less in regular paroxysms than happens in the remitting fever of infants, but giving a hectic flush to the cheeks, which, when the fever has subsided, are of a pallid hue. The appetite is extremely irregular; sometimes it is nearly gone, at other times it is voracious, and attended with a sense of craving, unless speedily satisfied. The symptom which particularly characterises this disease, when occurring in conjunction with those above stated, is shooting pains in the abdomen, varying considerably, both in their seat and their intensity, at different times. These pains, though felt more or less every day, occur only at intervals, and frequently, after a longer intermission than usual, they return with more severity than before.

The belly now begins to swell and to grow hard, while, at the same time, the limbs and countenance are emaciated: the strength and spirits decline; the hectic fever is more and more distinctly marked, and exerts its usual undermining influence on the constitution. Cough frequently attends this complaint in its latter stages, and the symptoms become blended with those of true pulmonary consumption. The disease of the mesenteric glands is often, indeed, found, on dissection, to have extended to other viscera, and more especially to the lungs: and tubercles, and even purulent matter, are not unfrequently found in them, although the symptoms during life did not particularly indicate any affection of these organs. The mesenteric glands themselves exhibit different appearances, according to the progress which the disease has made: in the early stages they are enlarged in their size, and are somewhat softer to the touch than in a natural state: but upon being cut into, do not exhibit any sensible deviation from their natural structure. If the patient, however, has not already sunk from the exhaustion of the constitutional affection, the disease proceeds to suppuration, the pus being intermixed with the white, soft, and curdy matter which is so peculiar to serofula.

Mesenteric consumption is a disease of frequent occurrence, and when it has proceeded a certain length, is almost invariably fatal. Yet we find, in some rare instances, that the powers of the constitution are sometimes called forth in an extraordinary manner under the most unpromising circumstances, and the disease recovered from. In the early periods of life, indeed, we see nature abounding in resources, which a more mature age cannot supply: and there is, to use the language of the late Dr. Gregory, "a greater luxuriance of life and health in infancy than at any other period. Infants, it is acknowledged, are more delicately sensible to injury than those advanced in life; but to compensate this, their fibres and vessels are more capable of distention, their whole system is more flexible, their fluids are less acid, and less disposed to putrescence; they bear all evacuations more easily,

easily, except that of blood; and, which is an important circumstance in their favour, they never suffer from the terrors of a distracted imagination. Their spirits are lively and equal; they quickly forget their past sufferings, and never anticipate the future. In consequence of these advantages, children recover from diseases, under such unfavourable circumstances as are never survived by adults. If they waste more quickly under sickness, their recovery from it is quick in proportion, and generally more complete than in older people; as diseases seldom leave those baneful effects on their constitutions so frequent in adults. In short, a physician ought scarce ever to despair of a child's life, while it continues to breathe."

The plan of treatment to be pursued in this disease, must be founded very much on the same principles as that of scrofula in general, modified, however, in some degree, by its peculiar seat, and by the functions of the parts affected. It is chiefly in the earlier stages that we can expect much efficacy from an alterative course of remedies in the removal of the glandular obstructions. As there is often much ambiguity between the symptoms of this disease and those occasioned by the presence of the round worm in the intestines, we should first satisfy ourselves that this is not the sole cause of the disorder. In both diseases there is a tumid belly, and emaciated extremities: so that the chief ground of distinction is derived from the effect of strong purgatives, which bring away worms in the one case, and none in the other. It is observed by Dr. Baillie, that startings and grinding of the teeth during sleep, occur very commonly in worms, but are rarely observed as symptoms of scrofulous enlargement of the mesenteric glands. Some discrimination, likewise, between the two diseases, may sometimes be derived from examining strictly into the nature of the constitution. If decided marks of scrofula shew themselves in an external part of the body, they will lead a practitioner more satisfactorily to the opinion, that the mesenteric glands are also affected with the same disease.

The principal alterative remedy on which any dependence can be placed is mercury, particularly in the form of calomel; half a grain, or a grain of which, may be given two or three times a week, in conjunction with, or succeeded by, some mild purgative. On the intermediate days, small doses of alkalis, with rhubarb, may be exhibited. Great attention should, at all times, be paid to the state of the bowels, which should be kept freely open: while the acrimony of their contents should be counteracted by absorbents, such as magnesia, when there is no diarrhoea, or by prepared chalk, or gentle astringents, in small doses, when this latter state prevails. For the removal of fever, the same means are to be employed as have already been pointed out when treating of the infantile remitting fever, under the head of *Diseases of INFANTS*. The calomel, combined with purgatives, may be continued, for several weeks, till a favourable change has been effected in the size and hardness of the belly. The milder vegetable tonics, such as chamomile, or cascarrilla, may then be tried, and according as the constitution will bear them, preparations of iron should be given, in order to strengthen the digestive organs, and the system in general. Together with these means, every circumstance which can contribute to general health should be attended to. Pure air, regular exercise, gentle frictions of the body and limbs, an easy dress, frequent washing of the whole body with soap and warm water in young children, or the cold bath in older children, and especially a light and nutritious diet, with such mild aromatics as may assist digestion, are some of the principal and most effectual means of securing the ground that has been gained, and of preventing a return, as well as

guarding against an attack, of the disease. For greater details on these points, see *Diseases of INFANTS*, and *SCROFULA*.

TABEYRO, in *Geography*, a town of Spain, in Galicia; 5 miles S.E. of St. Jago.

TABIANA, in *Ancient Geography*, an island of the Persian gulf, near and west of the isle of Sophthe, and over against the promontory of Taocce.

TABIANA, in *Geography*, a town of the duchy of Parma; 13 miles W. of Parma.

TABIDIUM, in *Ancient Geography*, a town in the interior of Africa, towards the source of the river Bagrada.

TABILLOLA, in *Geography*, a town on the south coast of the island of Machian. N. lat.  $0^{\circ} 13'$ . E. long.  $127^{\circ} 21'$ .

TABINSK, a town of Russia, in the government of Upha, on the Bielaia; 40 miles S. of Upha. N. lat.  $54^{\circ}$ . E. long.  $56^{\circ} 14'$ .

TABLADA, a town of South America, in the province of Carthagena; 80 miles S. of Mompox.

TABLANÄTZ, a town of Istria; 24 miles N.E. of Pedena.

TABLAS, one of the Philippine islands, about 25 miles long from north to south, but narrow and intersected by a deep bay on the east and west coasts. N. lat.  $12^{\circ} 30'$ . E. long.  $121^{\circ} 40'$ .

TABLATURE, in *Anatomy*, a division or parting of the skull into two tables.

TABLATURE, *Tablatura*, in *Musie*, in general, is when to express the sounds or notes of a composition, we use letters of the alphabet, or cyphers, or any other characters not used in the modern music.

TABLATURE, in its stricter sense, is the manner of writing a piece for the lute, theorbo, guitarre, bass viol, or the like; which is done by writing on several parallel lines (each of which represents a string of the instrument) certain letters of the alphabet, referring to the frets on the neck of the instrument: of which A marks, that the string is to be struck open, *i. e.* without putting the finger of the left hand on the head; B shews, that one of the fingers is to be put on the first stop; C, on the second; D, on the third, &c.

The time of the notes is signified by marks over the letters of a hooked form, that answer to the minim, crotchet, quaver, &c. in the French tablature; but the Italians and Spaniards, till of late years, made use of figures instead of letters.

The tablature of the lute is usually written in letters of the alphabet, and that of the harpsichord in the common notes.

TABLE, TABULA, a moveable, usually made of wood, or stone supported on pillars, or the like; for the commodious reception of things placed upon it.

Moses made a table, in the tabernacle, for laying the shew-bread upon, described by Philo Judæus as two cubits long, one broad, and one and a half high.

Among Christians, the *table*, or *Lord's table*, signifies the sacrament of the Lord's supper. See COMMUNION.

TABLE, *Round, Knights of the Round Table*, a military order supposed to have been instituted by Arthur, the first king of the Britons, in the year 516.

They are said to have been twenty-four in number; all selected from among the bravest of the nation.

The round table, which gave them their title, was an invention of that prince, to avoid disputes about the upper and lower end, and to take away all emulation as to places.

Lesley assures us, he saw the table at Winchester; at least, he says, if he might believe the keepers of it, who still shew

show it with great solemnity. He adds, that the names of a great number of knights, written around it, seemed to confirm the truth of the tradition.

Larrey also, and several other authors, make no scruple to relate this fable of knighthood as matter of history: but that it is a fable, is certain; F. Papebroch having shewn, that there was no such thing as an order of knights before the sixth century.

Camden also observes, that the table at Winchester is of a structure much more modern than the sixth century. It is to be added, that Arthur himself is esteemed by many no more than a fabulous prince.

An excellent historian observes, that Arthur was undoubtedly a great general, though his actions have given occasion to innumerable fables; and though the institution of the "Knights of the Round Table" has served as a foundation for many fabulous relations, it is not to be deemed altogether chimerical. For where is the improbability that Arthur should institute an order of knighthood in Britain, when we learn from the letters of Cassiodorus, that Theodoric, king of the Ostrogoths, instituted one in Italy in the same century. Rapin's Hist. of Eng. vol. i. p. 39. fol.

However, others have supposed that the round table was not any military order, but rather a kind of just, or military exercise, between two persons armed with lances. Several authors say that Arthur, duke of Bretagne, renewed it. See Matthew Paris, the abbot Justiniani, and F. Helyot.

Paulus Jovius says, it was under the empire of Frederic Barbarossa that the knights of the Round Table first began to be talked of; others attribute their origin to the factions of the Guelphs and Gibellins. King Edward I. built a house called the Round Table, the court of which was two hundred feet in diameter. Du-Cange Gloss. *Tabula*.

**TABLE**, in *Architecture*, a smooth, simple member, or ornament, of various forms, but most usually in that of a long square. See **PLATBAND**.

**TABLE**, *Projecting*, is such a one as stands out from the naked of the wall, pedestal, or other matter which it adorns.

**TABLE**, *Rak'd*. See **RAKING-TABLE**.

**TABLE**, *Raised*, an embossment in a frontispiece, for the putting an inscription, or other ornament, in sculpture. This is what M. Perrault understands by *abaqus* in Vitruvius.

**TABLE**, *Crowned*, that covered with a cornice, and in which is cut a basso-relievo, or a piece of black marble insculpted, for an inscription.

**TABLE**, *Rusticated*, that which is picked, and whose surface seems rough, as in grottos, &c. See **RUSTICS**.

**TABLE**, *Water*. See **WATER-TABLE**.

**TABLE**, *Plain*, a surveying instrument. See **PLAIN TABLE**.

**TABLE**, in *Perspective*, denotes a plain surface, supposed to be transparent, and perpendicular to the horizon.

It is always imagined to be placed at a certain distance between the eye and objects, for the objects to be represented thereon by means of visual rays passing from every point thereof, through the table to the eye.

Whence it is also called *perspective plane*. See **PERSPECTIVE**.

**TABLE**, in *Anatomy*. The cranium is said to be composed of two tables, or laminae; i. e. it is double, as if it consisted of two bones laid one over another. See **SKULL**.

**TABLE** of *Pythagoras*, called also *multiplication-table*, is a square formed of an hundred or more lesser squares, or cells, containing the products of the several digits, or simple numbers, multiplied by each other. See this table under **MULTIPLICATION**.

**TABLES**, *Laws of the Twelve*, were the first set of laws of the Romans; thus called, either because the Romans then wrote with a style on thin wooden tables, covered with wax; or, rather, because they were engraved on tables, or plates of copper, to be exposed in the most noted part of the public forum. Wood, brass, or ivory, might be successively employed.

After the expulsion of the kings, as the Romans were then without any fixed or certain system of law; at least, had none ample enough to take in the various cases that might fall between particular persons; it was resolved to adopt the best and wisest laws of the Greeks.

One Hermodorus, to whom a statue was erected in the forum, was first appointed to translate them; and the decemviri afterwards compiled and reduced them into ten tables. After immense care and application, they were, at length, enacted and confirmed by the senate, and an assembly of the people, in the year of Rome 303.

The following year they found some things wanting therein, which they supplied from the laws of the former kings of Rome, and from certain customs, which long use had authorized: all these, being engraven on two other tables, made the *law of the twelve tables*, so famous in the Roman jurisprudence; the source and foundation of civil or Roman law. See **CIVIL LAW**.

The laws of the twelve tables were also called *decemviral laws*, from the officers entrusted with the composing them. See **DECEMVIRI**.

These laws of the decemviri were dictated by the rigid and jealous spirit of an aristocracy, which had yielded with reluctance to the just demands of the people. But the substance of the twelve tables was adapted to the state of the city; and the Romans must have emerged from barbarism, since they were capable of studying and embracing the institutions of their more enlightened neighbours. Mr. Gibbon suggests, that a motive of national pride induced Livy and Dionysius to believe, that deputies from Rome visited Athens under the wife and splendid administration of Pericles, and that the laws of Solon were transfused into the twelve tables. If such an embassy, says the historian of the Roman empire, had indeed been received from the barbarians of Hesperia, the Roman name would have been familiar to the Greeks before the reign of Alexander, and the faintest evidence would have been explored and celebrated by the curiosity of succeeding times. But the Athenian monuments are silent; nor will it seem credible that the patricians should undertake a long and perilous navigation, to copy the purest model of a democracy. In the comparison of the tables of Solon with those of the decemvirs, some copied resemblance may be found; some rules which nature and reason have revealed to every society; some proofs of a common descent from Egypt or Phœnicia. But in all the great lines of public and private jurisprudence, the legislators of Rome and Athens appear to be strangers or adverse to each other.

Whatever, as the same historian proceeds, might be the origin or the merit of the twelve tables, they obtained among the Romans that blind and partial reverence which the lawyers of every country delight to bestow on their municipal institutions. The study is recommended by Cicero as equally pleasant and instructive. "How admirable," says the Roman orator, with honest or affected prejudice, "is the wisdom of our ancestors! We alone are the masters of civil prudence; and our superiority is the more conspicuous, if we deign to cast our eyes on the rude and almost ridiculous jurisprudence of Dracon, of Solon, and of Lycurgus."

The twelve tables were committed to the memory of the young, and the meditation of the old; they were transcribed and illustrated with learned diligence; they had escaped the flames of the Gauls, they subsisted in the age of Justinian, and their subsequent loss has been imperfectly restored by the labours of modern critics.

It is a great pity this system of law should have perished through the injuries of time: we have now nothing of it, but a few fragments dispersed in divers authors. J. Gothofred has collected them together, and we have them in Rufinus, and some other authors. The Latin is very old and barbarous, and remarkably obscure. See *CIVIL LAW*.

Although these venerable monuments of antiquity were considered as the rule of right and the fountain of justice, they were overwhelmed by the weight and variety of new laws, which, at the end of five centuries, became a grievance more intolerable than the vices of the city.

The laws of the twelve tables have been justly charged with inexcusable severity. They are written, says Mr. Gibbon, like the statutes of Draco, in characters of blood. They approve the inhuman and unequal principle of retaliation; and the forfeit of an eye for an eye, a tooth for a tooth, a limb for a limb, is rigorously exacted, unless the offender can redeem his freedom by a fine of 300 lbs. of copper. Besides the slighter chastisements of flagellation and servitude very liberally distributed by the decemvirs, nine crimes of a very different complexion are adjudged worthy of death: *viz.* 1. Any act of treason against the state, or of correspondence with the public enemy; 2. Nocturnal meetings in the city, under any pretence of pleasure, or religion, or the public good; 3. The murder of a citizen; 4. The malice of an incendiary; 5. Judicial perjury; 6. The corruption of a judge, who accepted bribes to pronounce an iniquitous sentence; 7. Libels or satires; 8. The nocturnal mischief of damaging or destroying a neighbour's corn; 9. Magical incantations. The cruelty of the twelve tables against insolvent debtors merits peculiar notice. After the judicial proof or confession of the debt, 30 days of grace were allowed before a Roman was delivered into the power of his fellow-citizen. In this private prison, 12 ounces of rice were his daily food; he might be bound with a chain of 15 pounds' weight; and his misery was thrice exposed in the market-place, to solicit the compassion of his friends and countrymen. At the expiration of 60 days, the debt was discharged by the loss of liberty or life: the insolvent debtor was either put to death, or sold in foreign slavery beyond the Tyber; but if several creditors were alike obstinate and unrelenting, they might legally dismember his body, and satiate their revenge by this horrid partition.

When the manners of Rome were insensibly polished, the criminal code of the decemvirs was abolished by the humanity of accusers, witnesses, and judges; and impunity became the consequence of immoderate rigour. The Porcian and Valerian laws prohibited the magistrates from inflicting on a free citizen any capital, or even corporal punishment; and the obsolete statutes of blood were artfully, and perhaps truly, ascribed to the spirit, not of patrician, but of civil, tyranny. Gibbon's *Decl. and Fall*, &c. vol. viii.

*TABLES of the Law, in Scripture History.* See *DECALOGUE*.

*TABLES, New, Tabule Novæ*, an edict occasionally published in the Roman commonwealth, for the abolishing all kinds of debts, and annulling all obligations.

It was thus called, in regard that all antecedent acts being destroyed, there were nothing but new ones to take place.

*TABLE, among Jewellers.* A *table diamond*, or other precious stone, is that whose upper surface is quite flat, and only the sides cut in angles: in which sense, a diamond cut *table-wise*, is used in opposition to a rose-diamond. See *DIAMOND*.

*TABLE, in the Glass-Manufacture*, denotes a circular sheet of finished window-glass. These tables are generally four feet in diameter, and each of them weighs 10, 10½, or 11 pounds. Twelve of these is called a *side* or a *crate* of glass. Some tables of glass have been four, and even five feet in diameter. Such have been made by Messrs. Attwood and Smith, formerly Hammond and Smith, of Gateshead, in the county of Durham; and these tables are the more valuable, as they yield larger squares than ever were made, except in plate-glass, and the quality also is of the best kind. The centre of the table of glass, where the punting iron was attached, is of course somewhat thicker, and is denominated by the workmen "bull's eye:" nevertheless, the rest of the plate is of an uniform thickness.

*TABLE* is also used for an index, or repertory, put at the beginning or end of a book, to direct the reader to any passage he may have occasion for.

Thus we may say, *table of matters; table of authors quoted; table of chapters, &c.* Tables, of themselves, sometimes make large volumes, as that of Dravitz on the civil and canon laws.

*TABLES of the Bible*, are called *Concordances*. See *CONCORDANCE*.

*TABLE-Rents.* See *BORD-LANDS*.

*TABLES of Houses*, among *Astrologists*, are certain tables, readily drawn up, for the assistance of practitioners in that art, for the erecting or drawing of figures or schemes. See *HOUSE*.

*TABLES, in Mathematics*, are systems of numbers, calculated to be ready at hand for expediting astronomical, geometrical, and other operations. See *CANON*.

*TABLES, Astronomical*, are computations of the motions, places, and other phenomena of the planets, both primary and secondary. See each planet.

The oldest astronomical tables are the Ptolemaic, found in Ptolemy's *Almagest*; but these now no longer agree with the heavens.

In 1252, Alphonso XI. king of Castile, undertook the correction of them, chiefly by the assistance of Isaac Hazen, a Jew; and spent four hundred thousand crowns therein. Thus arose the *Alphonfine* tables, to which that prince himself prefixed a preface. But the deficiency of these, also, was soon perceived by Purbachius and Regiomontanus; upon which Regiomontanus, and after him Waltherus and Warnerus, applied themselves to celestial observations, for the farther amending of them; but death prevented any progress therein.

Copernicus, in his books of the celestial revolutions, instead of the Alphonfine tables, gives others of his own calculation, from the latter, and partly from his own observations.

From Copernicus's observations and theories, Erasmus Reinholdus afterwards compiled the *Prutenic* tables, which have been printed several times, and in several places.

Tycho de Brahe, even in his youth, became sensible of the deficiency of the *Prutenic* tables; which was what determined him to apply himself, with so much vigour, to celestial observations: yet all he did, by them, was to adjust the motions of the sun and moon; though Longomontanus, from the fame, to the theories of the several planets published in his "*Astronomia Danica*," added tables of their motions, now called the *Danish* tables; and Kepler likewise, from

from the same, in 1627, published the *Rudolphine* tables, which are much esteemed.

These were afterwards, anno 1650, turned into another form, by Maria Cunitia, whose astronomical tables, comprehending the effect of Kepler's physical hypothesis, are exceedingly easy, and satisfy all the phenomena, without any trouble of calculation, or any mention of logarithms; so that the Rudolphine calculus is here greatly improved.

Mercator made a like attempt in his *Astronomical Institution*, published in 1676, and the like did J. Bap. Morini, whose abridgement of the Rudolphine tables was prefixed to a Latin version of Street's "*Astronomia Carolina*," published in 1705.

Lansbergius, indeed, endeavoured to discredit the Rudolphine tables, and framed *Perpetual* tables, as he calls them, of the heavenly motions; but his attempt was never much regarded by the astronomers; and our countryman Horrox warmly attacked him, in his defence of the Keplerian astronomy.

Since the Rudolphine tables, many others have been published; as the *Philolaic* tables of Bullialdus; the *Britannic* tables of Vincent Wing, calculated on Bullialdus's hypothesis; the *Britannic* tables of Newton; the French ones of the count de Pagan; the *Caroline* tables of Street, all calculated on Dr. Ward's hypothesis, and the *Novalmagesic* tables of Ricciolus. Among these, however, the Philolaic and Caroline tables are esteemed the best; inasmuch that Mr. Whiston, by the advice of Mr. Flamsteed (a person of undoubted authority in such cases) thought fit to subjoin the Caroline tables to his astronomical lectures.

The *Ludovician* tables, published in 1702, by M. de la Hire, are constructed wholly from his own observations, and without the assistance of any hypothesis; which, before the invention of the micrometer, telescope, and the pendulum clock, was held impossible.

Another set of tables, Dr. Halley, the astronomer royal, long laboured to perfect.

M. le Monnier, in 1746, published in his "*Institutions Astronomiques*" tables of the motions of the sun, moon, and satellites, of refractions, and of the places of the fixed stars. M. de la Hire has also published tables of the planets, and M. de la Caille tables of the sun. Mayer constructed tables of the moon; and we have many astronomical tables of various kinds, and computed with different views, in our modern books of astronomy, navigation, &c. For an account of several, and especially of those published annually under the direction of the commissioners of longitude, see *ALMANAC*, *EPIHEMERIDES*, and *LONGITUDE*.

For *TABLES relating to annuities*, &c. see *ANNUITIES*, *EXPECTATION of Life*, *LIFE-ANNUITIES*, *MORTALITY*, and *SURVIVORSHIP*.

*TABLES, Sexagenary.* See *SEXAGENARY*.

For *TABLES of the Stars*, see *CATALOGUE* and *STAR*.

*TABLES of Sines, Tangents, and Secants*, of every degree and minute of a quadrant, used in trigonometrical operations, are usually called *Canons*; which see. See also *SINE*.

*TABLES of Logarithms, Rhumbs*, used in geometry, navigation, &c. See *LOGARITHM* and *RHUMB*.

*TABLES, Loxodromic*, are tables in which the difference of longitude, and quantity of the way in any rhumb, are exhibited to every ten minutes of every degree of the quadrant variation of the latitude. See *RHUMB*.

*TABLE of Heights*, in English feet, from the level of the sea.

The Caspian sea, lower by	- - - -	306
The Thames at Hampton, Roy	- - - -	14½
The Tiber at Rome	- - - -	33

The Seine at Paris, mean height	- - - -	36½
The Thames, at Buckingham-stairs, 15½ feet below } the pavement in the left-hand arcade	- - - -	43

By barometrical comparison with the Seine and the Mediterranean; but this height is probably too great. Roy supposes the low water of the spring tides at Isleworth to be only one foot above the mean surface of the ocean. He allows seven feet for the difference of the low water at the Nore and at Isleworth, and taking 18 feet for the height of the spring tide, adds one-third of this for the mean height of the sea. At Hampton, the Thames is 13½ feet above low water-mark at Isleworth.

The pagoda in Kew gardens, from the ground	- - - -	116½
The west end of the Tarpeian rock	- - - -	151
The Palatine hill	- - - -	166
The Claudian aqueduct, bottom of the canal	- - - -	208
The Janiculum	- - - -	293
The crosses at St. Paul's, from the ground	- - - -	340
St. Peter's, summit of the crosses	- - - -	535
From the ground	471	
Arthur's seat, from Leith pier-head	- - - -	803
Lake of Geneva	- - - -	1230
Its greatest depth	393	
Mount Vefuvius, base of the cone	- - - -	2021
Skiddaw	- - - -	3270
Chamouny, ground floor of the inn	- - - -	3367
Mount Vefuvius, mouth of the crater	- - - -	3938

For the heights of other mountains, &c.; see *MOUNTAIN*.

It may be observed, with respect to general Roy's calculation of the mean height of the sea, that it does not appear that in rivers, or even in narrow seas, we ought to add one-third of the height of the tides only to that of low water, in order to find the level; for it is probable that even the original tides may often resemble those of lakes, where, for want of breadths, the effects of a spheroidal tide cannot take place, and the elevation and depression are very nearly equal.

*TABLE, in Heraldry.* Coats, or escutcheons, containing nothing but the mere colour of the field, and not charged with any bearing, figure, or moveable, are called *tables d'attente*, *tables of expectation*, or *tabula rasa*.

*TABLE Bay*, in *Geography*, a bay situated on the west coast of the southern extremity of Africa, near which are the fort and town of the Cape of Good Hope. This bay is formed by three lofty mountains. Cape Town, the capital of the colony, lies on the S.E. angle of the bay. The primary object to which Table bay is subservient, is the convenience of a plentiful stream of pure limpid water, rushing out of the mountain, and this circumstance determined the first settlers in their choice of the site for the town. If this had not been the case, the first settlers would unquestionably have given the preference to Saldanha bay, the only defect of which is the want of fresh water near it; whereas Table bay is faulty in every point that constitutes a proper place for the resort of shipping, and so boisterous for four months in the year, as totally to exclude all ships from entering into it. The anchoring ground in this bay is tolerably good; but the shifting of the sand leaves bare sometimes whole ridges of the same kind of hard blue schistus that appears every where on the west shore of the bay. These ridges are so sharp, that a cable that comes across them will be cut in pieces. Hence it has happened, that the bay is full of anchors, which have never been fished up, and these contribute, as well as the rocks, to cut and chafe the

the cables of ships. If some pains be not taken to remove the anchors, the number of which is annually increasing, a clear anchorage for a single large ship will not be found. It has been proposed to sink mooring-chains for large ships, instead of their lying at anchor. During the S.E. winds, which blow from September to the end of April, and which is the season when all ships bound for the Cape resort to Table bay, the only danger is that of their being driven out to sea from the wear and tear of the cables. However, as the sea is not high, it is hardly possible for a ship to go on shore, unless it be on the S. point of Robben island, which being distant seven or eight miles, may be always avoided. Within this island and the continent there is excellent anchorage, where ships so driven out usually bring up. Here also ships intending to come into Table bay generally wait the abatement of a S.E. wind, if it shall happen to blow too strong for their working up against it. This island is too small and too far to afford the least shelter to Table bay from the N.W. winds that blow in the winter months. Naval officers seem to be divided in opinion as to the preference of Table bay or Simon's bay, (see *SIMON'S BAY*), which lies on the eastern side of the peninsula, in the great bay of False, and which is the usual resort of shipping for five months in the year. Both are defective, but the latter appears to be more secure, from the circumstance of few, if any, ships having been ever known to drive on shore from their anchors, whilst scarcely a season passes without the loss of some in Table bay. In the winter months, when the wind blows from N. to N.W., 40 or 50 ships may lie at anchor perfectly secure in Simon's bay, and eight or ten may be sufficiently sheltered in the strongest south-eastern. From a survey of the Great False bay in 1797, the exact situation was ascertained of a very dangerous rock, placed directly in the passage of ships into Simon's bay. The months in which ships usually resort to this bay, are from May to September inclusive. The distance from Cape Town, being 24 miles, and the badness of the road, mostly deep sand and splashes of water, render the communication at all times difficult, but more especially in winter; and few supplies are to be had at Simon's town, a name given to a collection of about a dozen houses. We have a chart of this bay in the second volume of Barrow's *Africa*. S. lat.  $53^{\circ} 50'$ . E. long.  $18^{\circ} 15'$ .—Also, a bay on the E. coast of Labrador. N. lat.  $53^{\circ} 44'$ . W. long.  $20^{\circ} 57'$ .

**TABLE Island**, a small island near the coast of Spitzbergen. N. lat.  $80^{\circ} 57'$ . E. long.  $20^{\circ} 30'$ .—Also, one of the New Hebrides, in the South Pacific ocean. S. lat.  $15^{\circ} 38'$ . E. long.  $167^{\circ} 7'$ .—Also, a small island in the East Indian sea, near the island of Paraguay. N. lat.  $9^{\circ} 15'$ . E. long.  $118^{\circ} 2'$ .—Also, a small island in the East Indian sea. N. lat.  $14^{\circ} 8'$ . E. long.  $93^{\circ} 32'$ .

**TABLE Mountain**, a mountain of Ireland, in the county of Wicklow; 15 miles W. of Wicklow.—Also, a mountain of Africa, near the Cape of Good Hope, so called from its flat summit. In fine weather this mountain is visible at sea at the distance of 28 or 30 miles. Table mountain supplies Table bay and Hout bay with streams of water.

**TABLE Mountains**, mountains of North Carolina. N. lat.  $36^{\circ}$ . W. long.  $81^{\circ} 40'$ .

**TABLE Point**, a cape on the S. coast of the island of Bali. S. lat.  $8^{\circ} 45'$ . E. long.  $115^{\circ} 11'$ .

**TABLE River**, a river of Louisiana, which runs into the Mississippi, N. lat.  $37^{\circ} 12'$ . W. long.  $90^{\circ} 11'$ .

**TABLE-Wheel**, in *Rope-Making*. To lay ropes, &c. from a six-thread line to a two-inch and half rope, a table-wheel is fixed in the wheel-house, at the upper end of the rope-walk,

in a frame fixed in the ground, with two sliding cheeks. The bands which work the whirls, go separately over each whirl, and round the turning-wheel. Some have six sets of whirls of different sizes, with iron spindles, and nibbed or forelock hooks at the outer end. A tackle-board, twelve inches broad, and three inches thick, with six holes for the hooks to go through, is fixed above the cheeks upon cleats.

**TABLEAU**, Fr. This word is used frequently in music, says Rousseau, to express the whole design of a composition in the score: as "this score is quite a picture;" "this opera is full of admirable paintings and imitations of nature."

**TABLET**, in *Pharmacy*. See **TABELLA**.

**TALIER**, LE, in *Geography*, a town of France, in the department of the Vendée; 6 miles S.S.E. of La Roche sur Yon.

**TABLING of Fines**, is the making a table for every county, where his majesty's writs run; containing the contents of every fine passed each term.

It is to be done by the chirographer of fines of the common pleas; who, every day of the next term, after engrossing any such fine, fixes one of the said tables in some open place of the said court, during its sitting; and likewise delivers to the sheriff of each county a content of the said tables made for that respective county, the term before the affizes, to be affixed in some place in the open court, while the justices sit.

**TABLING**, in *Ship-Building*, letting one piece of timber into another by alternate scores or projections from the middle, so that it cannot be drawn asunder either lengthwise or sidewise; such are beams, &c.

**TABLING**, in *Sail-Making*, a broad hem made on the skirts of sails, by turning the edge of the canvas over and sewing it down. It is to strengthen the sail for sewing on the bolt-rope.

**TABO DAGROU**, or *Little Dieppe*, in *Geography*, a town of Africa, on the Grain Coast.

**TABO DUNE**, a sea-port of Africa, on the Ivory Coast; 90 miles from Cape Palmas.

**TABOA**, a town of Portugal, in the province of Beira, on the Mondego; 9 miles S. of Viseu.

**TABOCANA**, a town of Africa, in the kingdom of Quoja. N. lat.  $5^{\circ} 55'$ .

**TABOCURU**, a river of Brazil, which runs into the Atlantic, near the island of Maranhao. S. lat.  $2^{\circ} 40'$ . W. long.  $45^{\circ} 30'$ .

**TABOGA**. See **TABAGO**.

**TABOLATO**, a town of Mexico, in the province of Culiacan; 30 miles W. of Culiacan.

**TABON**, in *Natural History*, a name given by the people of the Philippine islands to a bird called in other places *daie*, and remarkable for the largeness of its eggs; though some accounts of these are certainly fabulous.

**TABONES**, in *Geography*, one of the small Philippine islands, near Masbate. N. lat.  $12^{\circ} 12'$ . E. long.  $123^{\circ} 5'$ .

**TABOO**, a town of Africa, and capital of a country, situated to the E. of Sahara. N. lat.  $24^{\circ}$ . E. long.  $12^{\circ} 10'$ .

**TABOO**, a term used in the Sandwich islands to denote a kind of religious interdiction, of very powerful and extensive operation. With places and persons that were tabooed, all intercourse was prohibited. The word was also used to express any thing sacred, or eminent, or devoted. Cook's Third Voyage, vol. iii. p. 164.

**TABOR**, or *Hradistie Hory Tabor*, i. e. the camp of Mount Tabor, in *Geography*, a town of Bohemia, in the circle of Bechin, founded by the Hussites, situated on a mountain, near the river Luznice, is naturally strong, and

it is fortified in the ancient manner, with a ditch, walls, and bulwarks. It had been the camp of John Ziska in the year 1420, and was raised to a royal borough by the emperor Sigismund. It was taken by stratagem by Rodolph II. in 1611, and also in 1621, 1648, and 1744; 10 miles N.E. of Bechin. N. lat. 49° 27'. E. long. 14° 28'.

TABOR, *Mount*, a mountain of Palestine, frequently mentioned in the Old Testament. (See Josh. xiv. 22. Judg. iv. 6. 12. Pf. lxxxix. 12. Jer. xlvi. 18. Hof. v. 1.) It stands about the middle of Lower Galilee, between Nazareth and the country of Genesareth. According to Josephus, it is 30 furlongs in height, and 26 in compass. It is an insulated mountain, situated on a plain (that of Esdracelon), and having a level area at the summit, very fertile and pleasant. According to Maundrell, this area is of an oval figure, extending in breadth about a furlong, and two furlongs in length. Josephus says, that he caused it to be surrounded by walls, within the space of 40 days, that he might thus, without doubt, render it more inaccessible to the Romans.

An ancient tradition informs us, that Jesus was transfigured upon mount Tabor (see Matt. xvii. 2. Mark. ix. 2. Luke, ix. 28.), and that this is the place which is called by St. Peter the "holy mount." (2 Pet. i. 18.) Some learned authors, however, are of opinion, that the transfiguration happened upon a mountain near Casarea Philippi, *i. e.* upon mount Panium, which is very high, according to Josephus. We find the city called Tabor, mentioned 1 Chron. vi. 77; but it is not well known, how it was situated with relation to the mount.

TABOR, *Tabour, Tabret, or Tabourin*, a small drum; (which see.) It is an accompaniment to a small pipe or fife; instruments very animating in a country dance.

TABORITES, or THABORITES, in *Ecclesiastical History*, a branch or sect of the ancient Hussites.

The Hussites, towards the beginning of the 15th century, dividing into several parties, and about the year 1420, into two great factions; one of them retired to a little mountain or rock, situate in Bohemia, 15 leagues from Prague, and there put themselves under the conduct of Ziska; building themselves a fort or castle, and a regular city, which they called *Tabor* or *Tabor*, either from the general word *thabor*, which in the Slavonic language signifies *castle*; or from the mountain *Tabor*, mentioned in Scripture; and hence they became denominated *Taborites*. Those of the other party were denominated *Calixtins*.

The Taborites not only insisted upon reducing the religion of Jesus to its primitive simplicity, but required also that the system of ecclesiastical government should be reformed in the same manner, the authority of the pope destroyed, and the form of divine worship changed; they demanded the erection of a new church and hierarchy, in which Christ alone should reign, and all things should be carried on by a divine direction and impulse. In maintaining these demands, some of their leaders went so far as to flatter themselves with the chimerical notion, that Christ would descend in person upon earth, armed with fire and sword, to extirpate heresy, and purify the church from its numerous corruptions. This enthusiastic class of Hussites alone, Mosheim says, we are to look upon as accountable for all these acts of violence, which are too indiscriminately laid to the charge of the Hussites in general, and to their two leaders, Ziska and Procopius, in particular. After the time of the council of Basil, in 1433, which endeavoured, though without success, to reconcile the Taborites with the Roman pontiff, they began to review their religious tenets, and their ecclesiastical discipline, with a design to

render them more perfect. This review, conducted with great prudence and impartiality, gave a rational aspect to the religion of this sect, who withdrew themselves from the war with Sigismund, in which they were engaged, abandoned the doctrines, which, upon serious examination, they found to be inconsistent with the genius and spirit of the Gospel, and banished from their communion all those whose disordered brains or licentious manners might expose them to reproach. The Taborites, thus new-modelled, were the same with those Bohemian brethren (or Picards, *i. e.* Beghards, as their adversaries called them) who joined Luther and his successors at the Reformation, and of whom there are at this day many of the descendants and followers in Poland and other countries. Mosh. Eccl. Hist. vol. iii.

TABORNOST, in *Geography*, a town of Africa, in the country of Darah; 120 miles S.E. of Morocco.

TABORO, a mountain of Naples, in Principato Citra, on the confines of Lavora.

TABOROWKA, a town of Poland, in the palatinate of Kiev; 16 miles W.N.W. of Bialaerkiev.

TABOTUVO, a town of Africa, on the Ivory Coast; 45 miles S.W. of Druin.

TABOU, a town of Africa, on the Ivory Coast; 36 miles S.W. of Druin.

TABOURET, *Privilege of the*, in France, is a privilege some great ladies enjoy, to sit, or have a stool, in the queen's presence.

TABRE, in *Geography*, a town of Hindoostan, in the Carnatic; 15 miles E. of Volconda.

TABREEZ, or TAURIS, a city of Persia, the capital of the province of Adirbeizan, or Azerbaijan. Sir William Jones, and other learned persons, are of opinion, that this city was the ancient Ecbatana. M. D'Anville, adjudging that honour to Hamadan, conceives Tauris to be Gaza, or Gunzaca, where Cyrus deposited the treasures of Cræsus, and which was afterwards taken by Heraclius. According to the Persians, Zobeida, the celebrated wife of Haroun-ul-Rashid, was its founder; but on their authority we can place little reliance. It is certain, however, that Tauris was a favourite residence of Haroun-ul-Rashid; and though he had not the honour of founding this city, it is probable that he improved and embellished it in a considerable degree. In the days of Chardin, it was one of the largest and most populous cities in the East, and, according to that traveller, contained half a million of inhabitants. But no town has suffered more from the ravages of war. Situated towards the frontiers of contending empires, it has alternately been occupied by Turks, Tartars, and Persians, and has been captured and sacked eight different times; but its ruin has been chiefly owing to the number of earthquakes which have, at different times, levelled its proudest edifices with the dust.

Tabreez does not now contain more than 30,000 inhabitants, and is one of the most wretched cities in Persia. It is seated on an immense plain at the foot of a mountain, on the banks of a small river, the waters of which are consumed in the cultivation. This river, called Agi, proceeds from the mountains at Bukum, and enters the plain of Tabreez three miles N. of that city. This city is surrounded with a decayed wall, and the only decent house in the place is a new barrack, erected by the prince for the accommodation of his troops. The ruins of the ancient city are very extensive and very mean, being nothing but a confused mass of old mud walls. Tabreez is situated in N. lat. 38° 10'. E. long. 46° 37'. Kinneir's Mem. of the Persian Empire.

TABUDA, in *Ancient Geography*, a river of Belgic Gaul, in the country of the Morini, near Gessoriacum Navale. Ptol.

TABUE',

**TABUE'**, in *Geography*, a town of Egypt, on the Nile; 9 miles S.W. of Menuf.

**TABUIL**, a town of South America, in the province of Tucuman; 20 miles E. of St. Fernando.

**TABULAR SPAR**, in *Mineralogy*, *Spaton tables*, Häüy; a species of lime-stone, generally of a greyish-white colour, but sometimes inclining to greenish-yellow or reddish-white. It occurs massive and crystallized in rectangular four-sided tables. The lustre of the principal fracture is shining and pearly; the structure is imperfectly lamellar. Tabular spar occurs in large distinct prismatic concretions, which are promiscuously aggregated: it is translucent, and phosphoresces when scratched with a knife: its specific gravity is 2.86. It is sometimes friable. When put into nitrous acid it effervesces, and then falls into grains. It is infusible by the blowpipe. The analysis, as given by Klaproth, is

Silex	-	-	-	50
Lime	-	-	-	45
Water	-	-	-	5

This mineral is of rare occurrence; its locality, as given by Stütz, is at Dognaska, in the bannat of Temesvar, in Hungary, where it occurs in blue-coloured primitive lime-stone, with garnets, actinolite, tremolite, and variegated copper. It is said by Estner to occur at Ozavitzza. In the new system of mineralogy proposed by Berzelius, this mineral is denominated a *bifiliciate of lime*; the oxygen contained by the different constituent parts being in the proportion of 6.3 and 1; the silex containing twice the oxygen of the lime, and the water the sixth part.

**TABULARIUM**, among the Romans, the name of that part of the treasury where the Elephantine books were kept.

**TABULARIUS**. See **TABELLIO**.

**TABULARUM APERTURA**. See **APERTURA**.

**TABULATUM**. See **TABELLA**.

**TABUM**, a word used by medical writers, to express a thin, sanious, and putrid humour, flowing from old ulcers, or from mortified parts, in cases where the vital powers are not sufficient for the generation of a perfect or concocted matter.

**TABY**, in *Geography*, a town of Sweden, in East Gothland; 14 miles S.E. of Nordkiöping.

**TACA**, a town of Japan, in the island of Xicoco; 20 miles S.W. of Tosa.

**TACALALPO**, a town of Mexico, in the province of Tabasco; 23 miles S.W. of Tabasco.

**TACALAYO**, a town of South America, in the province of Chaco; 35 miles N. of St. Salvador de Jugui.

**TACALEA**, a town of South America, in the province of Carthagen, at the conflux of the Cauca and Madalena; 85 miles S.E. of Carthagen.

**TACAMAHACA**, in *Gardening*, a tree of the ornamental and sweet-smelling kind, which is often planted out in shrubberies, borders, and other parts of pleasure-grounds with much propriety and advantage in its appearance, and the grateful odour which it diffuses all around it. See **POPULUS**.

**TACAMAHACA**, or *Tacamacha*, a kind of resinous gum, distilling from the trunk of a very large tree, a species of poplar, growing in New Spain, Canada, and other parts of America; but in the greatest abundance, as it is said, in the island of Madagafcar.

The tree is not unlike our poplar-tree, only bigger and taller; its leaves long and green, its fruit red, of the size of our walnuts, exceedingly resinous, and containing a stone like our peaches. See **POPULUS Balsamifera**.

The wood of the tree makes good timber for ships, and the gum it yields serves there for their caulking, though its chief use with us is in medicine.

Two sorts of this resin are sometimes to be met with. The best, called tacamahaca in shells, from its being collected in a kind of gourd shells, is somewhat unctuous and soft, of a pale yellowish or greenish colour, a bitterish aromatic taste, and a fragrant delightful smell, approaching to that of lavender and ambergris. This sort is very rare. That commonly found in the shops is in transparent grains or globes, of a whitish, yellowish, brownish, or greenish colour, and of a less grateful smell than the foregoing.

The first is said to exude from the fruit of the tree; the other from incisions made in the trunk. The tree, as raised among us, affords in its young buds, or the rudiments of the leaves, a resinous juice of the same kind of fragrance.

Tacamahaca is chiefly used as an ingredient in warm nerve plasters; though the fragrance and taste of the finer sort indicate its being applicable to other purposes, as an internal balsamic corroborant. Both kinds dissolve in rectified spirit into a gold-coloured liquor, with a small quantity of remaining impurity: they also impregnate water considerably with their smell and taste, but give out very little of their substance to this menstruum. Lewis. The Indians are said to use it for all kinds of pains. Schroder affirms, that he has seen intolerable pains in the leg removed by it.

**TACAMES**, or **ATACAMES**, in *Geography*, a government of South America, in the province of Quito, situated W. of the western Cordilleras of the Andes, bordering northward on the department of Barbacoas, in the government of Popayan, westward on the South sea, and southward on the territory of Guayaquil, and reaching along the coast from the island of Tumaco and the house of Hufmal, which lie in N. lat. 1° 30', to the bay of Caracas, and the mountains of Balsamo, in S. lat. 0° 34'. This jurisdiction was long neglected after the conquest of it by Sebastian de Belalcazar, the introduction of the Christian religion, and its homage to the king of Spain. At length, however, it was discovered that by making settlements here, the intercourse and commerce between Quito and Terra Firma would be facilitated; and with this view, Paul Durango Delgadillo was, in the year 1621, appointed governor of Atacames and Rio de las Esmeraldas. He was succeeded by Francisco Perez Menacho in 1626, and other governors, who failed in the accomplishment of the object for which they were appointed: at length Don Pedro Vicente Maldonado, in 1741, laid open a direct communication betwixt Quito and the Rio de las Esmeraldas, and in recompence of his success he was confirmed as governor in 1746, and in the following year the country was formally constituted a government. This government contains twenty towns, which are but small and poor, five of them situated on the sea-coast, and the others being inland places. The inhabitants of the five towns are Spaniards, Mestizos, Negroes, and Casts, which sprung from these three classes. Those of the other fifteen are in general Indians, among whom are few Spaniards, Mulattos, or Negroes. The spiritual concerns of the district are entrusted to eleven priests, who reside in the great towns, and occasionally visit the others, in which are chapels of ease.

The temperature of Atacames is like that of Guayaquil, and accordingly it produces the same kinds of vegetables, grains, and fruits; some of them to greater perfection, on account of its more elevated situation. It likewise produces in great abundance vanillas, achote, sarsaparilla, and indigo. Considerable quantities of wax are made here, and the forests of the country afford a great variety of trees of

large size and lofty height, fit for domestic and naval purposes. (Juan and Ulloa's Voyage, vol. i.) M. d'Anville, in his map of Quito, has marked the supposed lost mine of Emeralds, about 20 miles to the south of the town of Tacames, which is situated in a bay of the Pacific ocean, to which it gives name; 110 miles N.W. of Quito. N. lat.  $0^{\circ} 52'$ . W. long.  $62^{\circ}$ .

TACAPHORIS, in *Ancient Geography*, a town of Africa, in the interior of Marmarica. Ptol.

TACARIGUA, *Bay or Lake*, in *Geography*, is situated in the government of Caraccas, in America, about one and a half league from the mouth of the river Tuy. Its form is circular, and its measure is about seven leagues from the sea, on the N.E. to its deepest reefs on the S.E. It abounds in all kinds of sea-fish, and is remarkable for the great number of alligators which are seen in it.

TACASARTA, in *Ancient Geography*, a town of Egypt, upon the route from Memphis to Pelusium. Anton. Itin.

TACASUKI, in *Geography*, a town of Japan, in the island of Nippon; 12 miles N.W. of Meaco.

TACATO, a town of Japan, in the island of Nippon; 48 miles S.S.W. of Jedo.

TACATUA, TACKUS, in *Ancient Geography*, a town situated on the coast of Africa, between Ruficades and Hippone; E. of the promontory of Tapfos, and W. of that of Hippi.

TACAU, in *Geography*, a town of Japan, in the island of Nippon; 90 miles N.W. of Jedo.

TACAXI, a small island of Japan, on the S. coast of the island of Ximo, at the entrance into the gulf of Ximabara.

TACAZZE', a river of Africa, next to the Nile the largest in Upper Abyssinia. Its principal branch rises in Angot, in a plain champaign country, about 200 miles S.E. of Gondar, near a spot called Souami Midre. It has three spring-heads, or sources, like the Nile: near it is the small village Gourri, signifying cold. The other branch of the Tacazzé rises in the frontiers of Begemder, near Dabuco, whence, running between Gouliou, Lassa, and Belessen, it joins with the Angot branch, and becomes the boundary between Tigré and Anihara. This river was called the Siris, or the river of the dog-star, whilst the uncivilized people, the Cushites of the island of Meroë, resided upon its banks. It was then called the Tannush Abay, or the lesser of two rivers that swelled with the tropical rains, which was the name given to it by the prelates from a comparison of it with the Nile. It was the Tacazzé in Derkin, or the dwelling of the Taka, before it joined the Nile in Baja, and it was the Astaboras of those of the ancients that took the Nile for the Siris. It is now the Atbara, giving its name to that peninsula, which it incloses on the E. as the Nile does on the W. and which was formerly the island of Meroë. Tacazzé is a pleasant river, shaded with fine lofty trees, and having its banks covered with tamarisks and bushes singularly fragrant. Its stream is very limpid, its water excellent, and it abounds with a great variety of fish: its coverts are also full of all sorts of game. During the inundation, it carries in its bed nearly one-third of all the water that falls in Abyssinia, rising to about three fathoms, tearing up rocks and large trees in its course, and forcing down their broken fragments scattered in its stream, with a noise like thunder echoed from a hundred hills. This river, though in many respects beautiful, has its disadvantages. From the falling of the first rains in March till November, it is death to sleep in the country adjoining to it, both within and without its banks. The inhabitants retire and live in villages on the top of the neighbouring mountains; and these are all robbers and assassins, who descend from their habitations in the heights to

lie in wait for, and plunder the travellers who pass that way. Its abundance of fish draws together a number of crocodiles: in its adjacent thickets are vast multitudes of lions and hyænas. The ford of this river is situated in N. lat.  $13^{\circ} 42' 45''$ . Bruce's Travels, vol. iii.

TACCA, in *Botany*, a Malay name, used by Rumphius, and adopted by the classical Forster, as well as by the younger Linnæus. The word being, though barbarous and unmeaning, easy of pronunciation, we are induced to acquiesce in these authorities, and to retain it, along with *Aucuba*, *Pandanus*, and a few other names so circumstanced. Sir Joseph Banks and Dr. Solander had called the same genus, very elegantly and judiciously, *Chaitæa*, from  $\chi\alpha\iota\tau\alpha$ , a flowing mane, or head of hair, in allusion to the spreading tuft of long capillary filaments, apparently a sort of bractæas, or abortive stalks, accompanying the flowers.—Forst. Gen. t. 35. Linn. Suppl. 37. Schreb. 229. Willd. Sp. Pl. v. 2. 200. Mart. Mill. Dict. v. 4. Brown Prodr. Nov. Holl. v. 1. 340. Ait. Hort. Kew. v. 2. 306. Juss. 56. Lamarek Illustr. t. 232. Gærtn. t. 14.—Class and order, *Hexandria Monogynia*. Nat. Ord. *Narcissi*, Juss. Akin to *Aroideæ* and *Aristolochiæ*, Brown.

Gen. Ch. Cal. Perianth superior, of one leaf, in six very deep, elliptic-oblong, equal, converging, permanent segments. Cor. none. Stam. Filaments six, opposite to the segments of the calyx, into whose base they are inserted, and half as long, equal, dilated, flat, oblong, incurved and vaulted at the summit; anthers sessile in the hollow of each filament, of two distinct lobes. Pist. Germen inferior, roundish; style short, cylindrical, with three furrows; stigmas three, spreading, dilated, cloven. Peric. Berry ovate, angular, of one cell. Seeds numerous, ovate, striated, "inserted into three receptacles annexed to the coat of the berry." Brown.

Ess. Ch. Calyx in six deep equal segments. Petals none. Filaments vaulted. Stigmas flatted. Berry inferior, angular, with many seeds.

1. *T. pinnatifida*. Pinnatifid Tacca, or Otaheite Salep. Linn. Suppl. 251. Forst. Prodr. 36. Pl. Escl. 59. Willd. n. 1. Ait. n. 1. Loureir. Cochin. 300. (Tacca; Rumph. Amboin. v. 5. 324—328. t. 112—114. Chaitæa Tacca; Banks Ic. Ined. apud Bibl. Linn. Leontice Leontopetaloides; Linn. Sp. Pl. 448. "Leontopetaloides; Amman. in Comm. Petrop. v. 8. 211. t. 13.")—Leaves pinnatifid.—Native of the East Indies, Cochinchina, the tropical part of New Holland, and the Society Islands; brought to England by Capt. Bligh, in 1793, but has not yet flowered. *Stem*. The root is tuberous and perennial. *Leaves* one or two, radical, on long stalks, erect, deeply three-cleft, with deeply and variously pinnatifid, acute, entire lobes, a foot long, smooth, reticulated with veins. *Footstalk* hollow, smooth. *Flower-stalk* radical, about a yard high, hollow, erect, unbranched, terminating in a simple umbel of several drooping, green, somewhat glaucous, flowers, accompanied by an involucre of about as many upright, partly pinnatifid, green leaves, near two inches long; with a greater number of much longer thread-shaped bodies, suspected by Mr. Brown to be abortive flower-stalks. The berries are black, larger than a gooseberry, but little juicy when ripe.

Forster says the fresh root is intensely bitter and acrid, though somewhat milder when cultivated. By being grated, and repeatedly washed in fresh water, it yields a very white mild powder, like starch, which is dried in the sun, and then serves for food, either in the manner of Salep, or baked in the form of cakes, which are even better than those made of Sago. The former mode of using this powder

is customary in the South-sea, the latter in the Molucca, islands. This root is also applied as a plaster, we presume fresh, for deep wounds made with darts or other weapons. It is well known that a similar powder, or mild wholesome flour, is obtained, by washing, from the roots of *Jatropha Manihot*, and various species of *Arum*, even our common *Arum maculatum*, as well as from raw potatoes.

2. *T. integrifolia*. Entire-leaved Tacca. Gawler in Curt. Mag. t. 1488. Ait. Epit. 375.—Leaves ovate, undivided.—Native of the East Indies, from whence it was sent by Dr. Roxburgh to sir Abraham Hume, and flowered in the stove at Wormleybury, in June 1812. The leaves are four or five inches long, probably often more, smooth, quite simple and entire, with one rib and many oblique veins; each on a stout, channelled, brown footstalk. Flowers umbellate, erect or decumbent, of a dingy green, with purple stalks. Leaves of the involucreum large, ovate, pale green with many purple ribs, and accompanied by a few white thread-shaped stalks, resembling the former. We have seen no specimen in flower.

TACE, Ital., in *Musica*, be silent.

TACET, Lat., is used when a vocal or instrumental part is to be silent during a whole movement: as in a mass, *Christe tacet*; in a concerto or sonata, *Largo tacet*, &c.

TACET, JOSEPH, in *Biography*, an eminent performer and master on the German flute, born, we believe, in France; but who came to England so early, and continued here so long, that by forgetting his own language, he spoke English like a native of the island. He was the first to adopt the additional keys of Quantz to the German flute, in order to correct the bad notes, and increased their number from three to five; though, we believe, he seldom used them all.

TAC-FREE, in *Old Charters*, an exemption from payments.

TACHAN, in *Geography*, a small island in the Chinese sea, near the coast of Cochinchina. N. lat. 12° 35'. E. long. 109° 14'.

TACHAR, a town of Thibet; 23 miles S. of Tourfan.

TACHARD, GUY, in *Biography*, a French Jesuit, who, after accompanying chevalier de Caumont, and the abbé de Choisi, on an embassy to Siam, returned to Europe in 1688, and having made another voyage to the Indies, died at Bengal about 1694. His "Two Voyages to Siam," in 2 vols. Paris, 1686 and 1689, re-printed at Amsterdam in 1700, well received at the time of their publication, have sunk in reputation on account of the credulity and exaggeration of the author, of which satisfactory evidence has been given by chevalier de Forbin, in his Memoirs. *Nouv. Dict. Histor.*

TACHAR-SEGHIN, in *Geography*, a town of Thibet; 50 miles S. of Tourfan.

TACHAS, in *Ichthyology*, a name given by some authors to the manati, or sea-cow.

TACHASARA, in *Ancient Geography*, a town of Asia, in the interior of Media, between Zalaca and Pharambara. *Ptol.*

TACHAU, or TACHOW, in *Geography*, a town of Bohemia, in the circle of Pilsen, taken by Zilkka by assault, and sacked in the year 1427; 34 miles W. of Pilsen. N. lat. 49° 47'. E. long. 12° 40'.

TACHBACH, a town of Germany, in the county of Henneberg; 8 miles E.S.E. of Meinungen.

TACHEMAL-ONDOUC, a town of Chinese Tartary. N. lat. 45° 59'. E. long. 122° 31'.

TACHEMPSO, or TACHOMPSO, in *Ancient Geography*, an island of Ethiopia, in the vicinity of Libya, partly occupied by the Egyptians, and partly by the Ethiopians.

TACHENS, in *Geography*, a lake of the archbishopric of Salzburg, five miles long, and about one wide; 14 miles N.W. of Salzburg.

TACHIA, in *Botany*, called *Tachi* by the Galibis in Guiana, because the hollow stem and branches of this shrub serve as a retreat for ants, the above word signifying, in the language of those people, an ant's nest. Aublet Guian. 75. t. 29. See MYRMECIA.

TACHIBOTA. See SALMASIA.

TACHIGALIA, *Tachigali* of the Galibis in Guiana. See CUBÆA.

TA-CHOU-CAO-HOTUN, in *Geography*, a town of Corea; 425 miles E. of Peking. N. lat. 40° 11'. E. long. 124° 53'.

TACHYGRAPHY, called also BRACHYGRAPHY, formed from ταχυς, *swift*, and γραφή, *writing*; the art of quick or short writing.

There have been various kinds of tachygraphy invented: among the Romans, there were certain notes used, each of which signified a word.

The rabbins have a kind of tachygraphy formed by abbreviations, which made a kind of technical words; wherein each consonant stands for a whole word: as רַבִּי, רַשִׁי, *rabbi*, which stands for *rabbi Schelomoh Jarri*. See NOTARICON.

In France, &c. the only tachygraphy used is, the retrenching of letters, or even whole syllables of words, as in *sdm* for *secundum*, *aut* for *autem*, *d* for *sed*, *o* for *non*, *participaon* for *participation*, &c.

The first printers imitated these abbreviations; but at present they are almost laid aside, except among scriveners, &c.

In England we have great variety of methods of tachygraphy, or short-hand; more by far, and those much better, easier, speedier, and more commodious, than what are known in any other part of the world: witness Shelton's, Wallis's, Rich's, Mafon's, Webster's, Weston's, Macaulay's, Annet's, Gurney's, Lyle's, Byrom's, Rees's, and several other short-hands. See STENOGRAPHY.

TACISSO, JEUNG, in *Geography*. See TASSASUDON.

TACIT ACCEPTANCE. See ACCEPTANCE.

TACIT Community. See COMMUNITY.

TACIT Decree, in *Roman Antiquity*, secret deliberations, to which none but old senators were summoned.

J. Capitolinus mentions a decree of this secret kind, which he calls *S. C. tacitum*, and says, that the use of them among the ancients was derived from the necessities of the public, when upon some imminent danger from enemies, the senate was either driven to some low and mean expedients, or to such measures as were proper to be executed before they were published, or such as they had a mind to keep secret even from friends; on which occasions they commonly resorted to a tacit decree, from which they excluded their clerks and servants, performing that part themselves, lest any thing should get abroad. *Capitol. de Gordian. c. 12.*

In the early times of the republic, there are several instances mentioned by historians of such private meetings of the senate, summoned by the consuls to their own houses; to which none but the old or proper senators were admitted, and of which the tribunes usually complained. *Vide Dion-Halic. l. x. 40. l. xi. 55. 57. Middlet. of Rom. Sen. p. 90.*

TACITUS, CAIUS CORNELIUS, in *Biography*, a well-known historian, was born about the year of the Christian era 57, at Interamna, or the modern Terni. His father was a Roman knight, and procurator of Belgic Gaul. Devoted from his youth to the cultivation of literature and rhetoric,

rhetoric, his reputation at maturity was so well established, that he was permitted by Julius Agricola, at the expiration of his consulate, which occurred in the year 77, to form a matrimonial connection with his daughter. Thus introduced into public life, he was honoured by the patronage of Vespasian, Titus, and Domitian. Having discharged the office of prætor, he withdrew from the capital for four years; and on his return he found the latter emperor exercising a tyranny which he bitterly lamented. His prospects, however, were brightened by the accession of Nerva to the consulship, in the year 97; and as his associate Verginius Rufus died before the termination of his office, Tacitus was appointed to be his successor, and commenced his literary career, if the "Dialogue concerning Orators" be not his composition, with an eloquent oration at the funeral of Verginius, of whom Pliny says that he "crowned the felicity of his life by possessing the most eloquent of eulogists at his death." In the early part of Trajan's reign, he concurred with his friend Pliny the Younger, in the accusation of Marcus Priscus for the crimes with which he was chargeable during his proconsulate of Africa. The conduct of Tacitus and Pliny on this occasion was honoured by the encomium of the senate in their sentence and condemnation of the culprit. The future circumstances of his life, and the precise time of his death, are unknown; but as he makes no allusion to the reign of Adrian, it is most probable that he did not survive that of Trajan.

The principal works of Tacitus were his "Annals," and his "History." The former comprehended the Roman affairs from the death of Augustus to that of Nero; but it has been transmitted to us in a very mutilated state. The latter comprised the period from the end of Nero to the death of Domitian; and now exists in an imperfect state, as the narrative does not extend far beyond the accession of Vespasian. His other works are, a "Life of Agricola," and a treatise "On the Manners of the Germans." The style of his writings is singularly concise, abrupt, and elliptical, so that the reader is often at a loss to comprehend his meaning. His aim seems to have been to comprize much in a small compass, and he has thus furnished a great variety of political maxims, which, by the brevity with which they are expressed, are peculiarly adapted to impress the memory. It is observed, however, by one of his biographers, that he occasionally discovers "an affectation of converting common remarks into aphorisms, and of philosophizing when he was only required to narrate." Nevertheless, as the same author remarks, "no prose writer in any language surpasses or perhaps equals him in force of description, and the choice of circumstances by which he dramatizes a scene, and brings it before the eyes of his reader; and no want of perspicuity appears in his style when employed in the relation of striking events." The writer whom we are now citing extols the moral merits of Tacitus as an historian, and gives him his full share of praise for inculcating the noblest principles of action, both public and private, and displaying the evils arising from uncontrolled power, united, as it generally must be, with vice and tyranny. "He was guarded," says the biographer, "by philosophy against credulity, and by the love of truth against calumny." He adds, "upon the whole, whatever defects may be justly imputed to him, his works can never fail to keep a distinguished place among the most valuable treasures which antiquity has bequeathed to us." The following editions of the works of Tacitus are those which are held in the highest estimation: viz. Ryckii, Lugd. Bat. 1687, 2 vols. 12mo.; Gronovii, Traj. 1721, 2 vols. 4to.; Ernesti, Lips. 1752 and 1772, 2 vols. 8vo.; Brotier, Paris, 1771, 4 vols. 4to. and 1776, 7 vols. 12mo.

Many translations in different languages are extant. Brotier Præf. Gen. Biog.

TACITUS, M. CLAUDIUS, an emperor of Rome, who was advanced to this eminence from the rank of senator, to which he belonged at the time of Aurelian's death, A.D. 275. He was then about 75 years of age, having been consul twice, bearing the character of distinguished wisdom and moderation, and enjoying a patrimony valued at between two and three millions sterling. An interregnum took place in consequence of the refusal of the army and senate to nominate an emperor, and had lasted nearly eight months. Tacitus wished to refer the choice to the army; but finding that he was the person to whom the attention of the public was directed, he withdrew to his country seat in Campania, and continued there two months. At length, the consul convoked the senate, and Tacitus appeared in the assembly. Being asked his opinion on the subject that had occasioned delay, he arose to reply; but he was immediately saluted, amid general acclamations, with the titles of Augustus and emperor. The plea of his age and infirmities was of no avail; constrained to accept the high honour on Sept. 25, A.D. 275, he entered on his office; the Roman people and the prætorian guards approving and confirming his election. His first object was to restore to the senate rights and privileges, which served to render the constitution a limited monarchy. After thus gratifying the senators, he proceeded to regulate and reform the public morals; exhibiting in his own conduct an example of simplicity and frugality, whilst he was unusually munificent in his attention to public objects. To literature he was a distinguished patron; and he paid particular respect to his ancestor, the historian Tacitus, directing ten copies of his works to be annually deposited in the public libraries. In order to secure the attachment of the army, he visited the camp at Thrace at the commencement of the year 276, promised the usual donative, and inflicted punishment on the principal persons who had been concerned in the murder of Aurelian. In process of time, dissensions broke out amongst the troops, and the malecontents being joined by the murderers of Aurelian, who had made their escape, either by direct violence, or by the vexation which they occasioned to the aged emperor, terminated his life at Tyana, in Cappadocia, after a reign of 200 days. Crevier. Gibbon.

TACK, in *Sail-Making*, the foremost lower corner of all fore and aft sails.

TACK, a rope used to confine the clues of the main and fore courses forward occasionally in a fixed position, and also to confine the tacks of stay-sails, boom-sails, and fore-sails of sloop; and the outer lower corners of studding-sails. The tacks of the main and fore courses are ropes cable-laid, and made tapering, having a large wall-knot at one end, which prevents its drawing through the clue of the sail.

TACK is also applied by analogy to that part of any sail to which the tack is usually fastened. A ship is said to be on the starboard or larboard tack when she is close-hauled, with the wind upon the starboard and larboard side: and in this sense, the distance which she sails in that position is considered as the length of the tack; although this is more frequently called a *board*. Falconer.

TACK, *To*, in *Sea Language*, is to change the course from one board to another, or to turn about the ship from the starboard to the larboard tack, in a contrary wind.

*Tacking* is also used, in a more enlarged sense, to signify that manœuvre in navigation, by which a ship makes an oblique progression to the windward, in a zigzag direction. This, however, is more usually called *beating*, or *turning to windward*.

windward. In order to explain the theory of tacking a ship, recourse must be had to the two first laws of motion, recited under *Laws of NATURE*: according to which, it is easy to conceive how a ship is compelled to turn into any direction, by the force of the wind acting upon her sails in horizontal lines. For the sails may be so arranged as to receive the current of air, either directly, or more or less obliquely: hence the motion communicated to the sails must necessarily conspire with that of the wind upon their surfaces. To make the ship tack, or turn round with her head to the windward, it is therefore necessary, after she has received the first impression from the helm, that the head-sails should be so disposed as to diminish the effort of the wind, in the first instant of her motion, and that the whole force of the wind should be exerted on the after-sails, which operating on the ship's stern, carries it round like a weather-cock. But since the action of the after-sails to turn the ship will unavoidably cease, when her head points to the windward, it then becomes necessary to use the head-sails to prevent her from falling off, and returning to her former situation. These are, accordingly, laid aback on the lee-side, to push the vessel's fore-part towards the opposite side, till she has fallen into the line of her course thereon, and fixed her sails to conform with that situation.

The first effort to turn the ship in tacking, communicated by the helm, which is then put to the lee-side, being announced by the pilot, or commanding officer, who then calls out, *Helm's a-lee!* the head-sails are immediately made to shiver in the wind, by casting loose their sheets or bow-lines. The pilot then calls, *Up tacks and sheets!* which is executed by loosening all the ropes which confine the corners of the lower sails, in order that they may be more readily shifted to the other side. When the ship has turned her head directly to windward, the pilot gives the order to turn about the sails on the main and mizen-masts, by the exclamation, *Haul main-sail, haul!* the bowlines and traces are then instantly cast off on one side, and as expeditiously drawn in on the other side, so as to wheel the yards about their masts: the lower corner of the main-sail is, by means of its tack, pulled down to its station at the chefs-tree; and all the after-sails are, at the same time, adjusted to stand upon the other board. Finally, when the ship has fallen off five or six points, the pilot cries, *Haul off all!* or, *let go, and haul!* the sails on the fore-mast are wheeled about by their braces; and as the ship has then a tendency to fall off, she is checked by the effort of the helm, which for that purpose is put *hard-a-lee*. The fore-tack, or the lower corner of the fore-sail, being fixed in its place, the bow-lines are hauled; and the other sails, which have been neglected in the hurry of tacking, are properly arranged to the wind; which exercise is called *trimming the sails*. Falconer.

**TACK of a Flag**, a line spliced into the eye at the bottom of the tabling, for securing the flag to the haliards.

**TACK-Stopper**. See STOPPER.

**TACK**, in *Rural Economy*, a term provincially made use of in some districts, as Gloucestershire, to signify a sort of shelf, within the dairy, for laying cheese upon while they are drying, and afterwards.

**TACK**, or *Tack of Land*, in *Agriculture*, is a word used in some parts of the nation, as those of the north, for the term of a lease. It, in short, denotes the means by which land is holden by the farmer, from the proprietor or real owner, in the intention of cultivation and improvement, for the advantages of the produce. It was in its origin a sort of feudal or military tenure of land: accordingly it is found, the writer of the corrected *Agricultural Report* of the

County of Peebles says, that, as military tenants, at first, became tenants for life, from being tenants at will; so the first notion of giving the security of independence to the cultivator of the soil, in Scotland, as elsewhere, was to give him security of possession for life. The life-rent tack seems, it is said, the first adopted species or kind of tack-holding, rendering the possessor independent, his situation respectable, and his rights and interests regarded. Superior privileges were accordingly bestowed upon the life-rent tack; the property in this tack was, and is, considered to be so complete, as to imply the full power of its alienation, in defiance of the proprietor's supposed essential and inherent right of the *delectus personæ*; and, when granted to a woman, was not considered as forfeited upon her marriage, as implying affignment contrary to the proprietor's right of *delectus*, in consequence of its falling under the husband's *jus mariti*; although such, it is said, is the absurd construction of Scots law, in regard to the effect of a woman's marriage, upon a tack for definite time, to which she should fall heir by inheritance, or even, perhaps, acquire by personal contract. The period of nineteen years seems, it is said, in Scotland, to have been considered as equivalent to the life of a person of age to enter upon a life-rent tack; and that, from this analogy, various privileges, originally communicated to the life-rent, would seem to have been extended to this species or kind of tack. As nineteen years may, however, be considered as a favourable exchange for a life-rent, this is, it is thought, probably the reason why the Scots tenant seems to have generally preferred this security; inasmuch that the mention of a tack, without specification of the term, in common habit suggested the idea of a nineteen years' lease. The privileges granted to cultivators, by legislating proprietors, seem, it is said, to have been granted slowly, with reluctance, and to no greater extent than what indispensable utility obviously and absolutely required. A short-sighted avarice, it is observed, wished to grasp at the fruits of the cultivation effected by the tenant's stock, as speedily as possible; even so prematurely, as to allow no sufficient security of time for their being effected at all: and the genius of law seems, it is thought, to have been universally inimical, both in modern and in ancient nations, to the long duration of leases, which seemed to keep back the proprietor from reaping the benefit of the increased value of his property. And that, when subsequent views of utility suggested the propriety of tacks of still longer duration, they were ventured upon with timidity, as an extension of a species of tenure, to which the genius of law was unfriendly; which, as yet, she had not recognized to that extent, and which she might be scrupulous in sanctioning. Such tacks, therefore, it is said, sought shelter under the form of the privileged tack of nineteen years, which had acquired an analogical stability, and whose talismanic influence was thought able to protect them: the whole term meant durst not, it is said, be avowedly expressed; but the tack was granted for two nineteens, or three nineteens of years, until the number of years proposed should be completed in nineteens.

The tack, though still somewhat loaded and encumbered by a remnant of the shackles and tyranny of the feudal state, so as to considerably obstruct and impede the credit and enterprise of agricultural pursuits, yet probably, in consequence of the different enactments and decisions since made, empower the holders by it, in the above part of the kingdom, perhaps to enjoy more security, it is thought, than what was ever bestowed upon the actual cultivators of the soil or land, either in ancient or in modern times. See TENANT and TENURE.

**TACKLE**, in a *Ship*, a machine formed by the communication

maniculation of a rope with an assemblage of blocks, and known in mechanics by the name of *pulley*.

Tackles are used in a ship to raise, remove, or secure weighty bodies, to support the masts, or to extend the sails and rigging. They are either moveable, as communicating with a runner; or fixed, as being hooked in an immoveable situation; and they are more or less complicated, with blocks and sheaves, in proportion to the efforts which they are intended to produce. That part of the tackle which is fixed to one of the blocks, &c. is called the *standing part*; all the rest are called *running parts*; and that on which the men pull, when employing the tackle, is called the *fall*. The application of the tackle to mechanical purposes is termed *hoisting* or *bowling*. Falconer.

The power of a tackle will be, the friction not considered, as the number of parts of the fall that are applied to sustain the weight. If a tackle consists of a double and a single block, and the weight to be hoisted is hung to the double block, there will be four parts of the fall; and the weight resting upon four ropes, equally stretched, each must bear the same part of the weight. Thus, suppose the weight hung to the double block be four hundred, then one hundred applied to the fall or hauling part will suspend it; and if as much more power be applied as will overcome the friction, it will purchase the weight: but had the weight been hooked to the single block, it would have rested on three ropes only, each of which would bear a third part of the weight; therefore, a third part of the weight being applied to the hoisting part of the fall, would suspend the weight, when hooked to the single block; as much more being applied as will overcome the friction, would purchase the weight.

The blocks that are fixed are only for the convenience of turning the direction of the fall; they add nothing to the power of the purchase, but, on the contrary, destroy so much as is necessary to overcome their friction, and are, therefore, to be avoided as much as possible.

Ropes, if tight laid, will not easily bend round small sheaves, but will take up a considerable part of the power to force them into their proper direction: hence it follows, that blocks with small pins, large sheaves, and slack-laid ropes, are the best materials to obviate friction, and make tackles with more ease.

The *anchor-stock* tackle is composed of a double block and a single block, strapped, with a hook and thimble. *Boom* tackles are composed of double and single blocks, strapped, with tails, and are used in getting the fludding-sail-booms in or out. *Bowline* tackle is composed of a long tackle, and a single block, strapped, with a hook and thimble: it is used to bowse up the main-bowline, when the ship is upon a wind. *Burton* tackles are composed of double and single blocks, and are used with pendants, to set up the shrouds, support the topsail-yards, &c. (See BURTON.) A *fish* tackle is composed of a long tackle, and a single block, strapped, with eyes, and is used with a pendant, to fish the anchor, and get it into its place. *Garnet* tackle is composed of a double block and a single block, strapped, with a hook and thimble: it is hooked to the sciotic-stay in merchant-ships, and is used to hoist goods, &c. in or out. (See GARNET.) *Jigger* tackles are composed of double and single blocks, strapped, with tails, and are used for topping the main and fore-yards by the lifts, &c. (See JIGGER.) *Luff* tackles are composed of double and single blocks, strapped, with a hook and thimble, and are used occasionally at any part of the ship. *Outboarder* tackle is composed of two single blocks, strapped, with tails, and is used to bowse out the jib-boom. *Port* tackles are com-

posed of a single block, attached to a span made fast to the outside of the port-lid, and a runner with two single blocks, all of which are made fast to the side of the beam nearest the port, and are used to hoist and lower the port-lids. *Quarter* tackles are composed of double and single blocks, strapped, with eyes, and lashed to the outer quarter of the yard and the lower block, with a hook and thimble: they are used to hoist up water and provisions. *Reef* tackles are composed of two double or two single blocks: one block is spliced into a pendant, and the other is strapped, with an eye; they are used to draw the extremities of the reefs close up to the yard-arms for reefing the sail. (See REEF.) *Relieving* tackles are luff tackles, used at the fore end of the tillar, when the tillar-ropes are damaged. (See RELIEVING Tackle.) *Ridge* tackle is composed of a double block, and a single block, strapped, with an eye, and is used to suspend the awning in the middle. *Rolling* tackles are luff tackles, used to the topsail-yards, to support them under a press of sail, and preserve the parrals. *Rudder* tackles are composed of a long tackle block and a single block, strapped, with hooks and thimbles: they are used to save the rudder, if unshipped by accident, or to steer by, if the tillar is broken. *Runner* tackles are composed of double and single blocks, and a pendant; the lower block is strapped, with a hook and thimble: they are used to set up the shrouds, and to get the mast-heads forward, for staying the masts. *Stay* tackles, main and fore, are composed of double and single blocks, strapped, with hooks and thimbles, except the block spliced into the pendant: they are used for getting the provisions, &c. out of the fore and main hold, and for getting the boats in or out. The pendant formerly travelled on the stay, by iron thimbles; but this has been discontinued in the navy, as they much injured the stay by the friction. *Staysail-stay* tackles are composed of double and single blocks; the lower blocks are strapped, with a hook and thimble: they are used to set up the jib, and other staysail-stays. *Shifting back-stay* tackles are composed of double and single blocks, strapped, with a hook and thimble, and are used to set up the shifting back-stays, where wanted. *Topmast-stay* and *preventa-stay* tackles are composed of long tackle blocks and single blocks; the lower blocks are strapped, with a hook and thimble: they are used to set the topmast and preventer stays. *Fore-top-gallant-stay* tackle is composed of a double and single block, and is used to set up the fore-topgallant-stay. *Tack* tackle is composed of a double and single block, strapped, with hooks and thimbles, and is used for bowling down the tack of fore and aft main-sails. The *top* tackle is composed of double or treble blocks: it is attached to the top-rope-pendant, and is used to erect the topmasts, at the heads of the lower masts. *Truss* tackles are composed of two double blocks, strapped, with hooks and thimbles, and are used to secure the lower yards to their masts, being hooked to the truss-pendant. *Winding* tackle is composed of a fourfold and a treble block, or a treble and a double block, strapped, with eyes: it is attached to the winding-tackle-pendant, and is chiefly used to get in and out the guns. (See Plate II. Rigging, fig. 17.) *Yard* tackles are composed of double and single blocks; the double blocks are spliced into the lower ends of the pendants, and the single blocks are strapped, with hooks and thimbles: they are used to hoist the boats in or out.

**TACKLE-Fall**, that end of the rope of a tackle which is bowled on, or the rope which composes the tackle.

**TACKLE, Gunner's**, that which serves to hale the ordnance in or out.

**TACKLE Pendants.** See PENDANT,

TACKLE,

**TACKLE**, *Tack*, is a small tackle used occasionally to pull down the tack of the principal sails of a ship to their respective stations. There is also a tackle of this kind constantly fixed to the tacks of the main-sail in brigs, sloops, and schooners, for the same purpose. Falconer.

**TACKRAMAH**, in *Geography*, a town of Africa, on the Gold Coast. N. lat.  $4^{\circ} 52'$ . W. long.  $3^{\circ} 10'$ .

**TACKSMAN**, in *Agriculture*, the tenant or person who holds or takes a tack of land of another. In subletting, the original person of this kind is, it is said, by the writer of the *Peebles Corrected Agricultural Report*, considered as bound to the proprietor, as well as the sub-tenant; whilst, in assignment, the original tenant is free, substituting the other in his place. In conformity to the analogy of the feudal law, therefore, it is said, as well as to the greater security of the proprietor, the Scottish law is considered as more favourable to sublet, than to assignment; because, in sublet, the first tenant does not relinquish his position as a *quasi*-vassal, and the purposes of the metaphorical *delectus* may be, thus, considered as metaphorically, or analogically fulfilled by this *fiat* *juris*, or *quasi*: moreover, too, the security of the proprietor, so far from being weakened, is greatly strengthened, in having his right of hypothec unimpaired, and the security of two instead of one. Upon this principle, it was considered, it is said, by the Scottish law oracle, Erskine, that a power of sublet was implied, in all cases where the contrary was not directly expressed; until the decision, in 1791, came to rectify the misconceptions of the people, when it was decided, that, in a tack of nineteen years, it was implied, in law construction, without any formal stipulation in the lease to that effect, that the power of *delectus* was retained; and that the tack was neither assignable nor sublettable.

But even Erskine allows, it is said, that, upon legal principles, an express stipulation in the tack against assignees, both *legal* and *voluntary*, would prevent the tack from being evicted by the tenant's creditors: otherwise a tack, unassignable by the tenant's voluntary deed, would, according to him, be evictable by adjudication, at the instance of the tenant's creditors: but even in that case, the creditors would be guilty of *lese-majeste* towards the sacred right of the *delectus*, were they to bring the reversion of the lease to a fair sale to the best bidder: they are debarred, therefore, it is said, from such unhallowed and irreverend measures; they can only enter upon administration, as responsible factors of the tenant's concerns.

**TACKUMBREET**, in *Geography*, a town of Africa, or, as it may be rather denominated, the ruins of an ancient town called "Siga," or "Sigeum," once the metropolis of Mauritania, situated on the coast of the Mediterranean, at the mouth of the river Tafna; 44 miles S.W. of Oran. N. lat.  $35^{\circ} 30'$ . W. long.  $0^{\circ} 55'$ .

**TACKYSERAI**, a town of Hindoostan, in Oude; 35 miles W. of Lucknow.

**TACLAOUR**, a town of Thibet. N. lat.  $38^{\circ} 5'$ . E. long.  $80^{\circ} 51'$ .

**TACOLA IMPERIUM**, in *Ancient Geography*, a port on the western coast of India, on this side of the Ganges; and now *Junkseylon*.

**TACOMA**, in *Geography*, a town of Mexico; 16 miles N. of Mexico.

**TACOMAR-TREE**, a name by which some authors call the fugar-cane.

**TACON MOUNTAIN**, in *Geography*, a mountain of America, in Massachusetts, S. of Great Barrington.

**TA-CONG-TO-CHE**, a town of the island of Formosa. N. lat.  $22^{\circ} 22'$ . E. long.  $120^{\circ} 4'$ .

**TA-COO**, a town of China, in the province of Pe-tche-li, within the mouth of the Pei-ho, or White river, and the first place of any note in the N.E. frontier of the country. The grand embassy to China arrived at this town in August 1795, and found here a considerable number of yachts, or large covered barges and boats of burden, fit for passing over the shallows of the *Pei-ho*, (which see,) and destined to convey the whole of the embassy as far as the river led towards the capital of the empire. Many of these vessels were eighty feet long, and very capacious; and yet they were so constructed of light wood, as not to sink more than eighteen inches into the water, though they were lofty above it. The cabins were high and airy above: there were births for the crew, and beneath the floors were lockers for securing the necessaries. The yacht appropriated to the ambassador had an apartment, consisting of an anti-chamber, a saloon, a bed-chamber and a closet; and its windows were adorned with a great number of glass-panes; whereas the frames of the windows of the other yachts were generally filled with a kind of paper, manufactured chiefly in Corea, having in its composition an unctuous substance, which rendered the paper more durable when exposed to the weather, as it was much less affected by the rain or any kind of moisture, than that which is made in Europe. During the ambassador's stay before Ta-coo, he was visited by the viceroy of the province, who, by order of the emperor, came from Pao-ting-foo, his usual place of residence, at the distance of a hundred miles; and who took up his abode at the principal temple of Ta-coo, consecrated to the god of the sea, to whom invocations were frequently addressed under the appellation of "Toong-hai-vaung," or king of the Eastern sea. Of this idol there were several figures in different brilliant edifices of porcelain, within one inclosure. Sir George Staunton, in his account of this embassy, has given an engraved representation of this Chinese Neptune, bearing in one hand a magnet, whilst he is sitting on the waves, with firmness, ease, and dignity, and thus conscious of his own security; and in the other, a dolphin, denoting his power over the inhabitants of the ocean. His beard flowed in all directions, and his agitated locks seemed to be intended for a personification of the troubled element. At a small distance from the "Hai-chin-miao," or temple of the sea-god, is the hall of audience of Ta-coo, situated in the midst of a spacious court.

**TACOTALPA**, a town of Mexico, in the province of Guaxaca, on the river Alvarado; 6 miles S.E. of Alvarado.

—**Alfo**, a town of Mexico, in the province of Tabasco; 30 miles S.W. of Villa Hermosa.

**TA-COU**, a river of China, which runs into the sea, 7 miles E.N.E. of Kiao.

**TACOUR**, a town of Hindoostan, in Mysore; 10 miles S. of Bangalore.

**TAC-POU-CHAI**, a town of Thibet; 250 miles S.E. of Lassa.

**TAC-POU-NAI**, a town of Thibet; 240 miles S.E. of Lassa.

**TAC-POUY COUROU-NAMKIN**, a town of Thibet; 145 miles S.E. of Lassa.

**TAC-POUY Lafoi**, a town of Thibet; 120 miles S.S.E. of Lassa.

**TACPOY**, a town of Thibet, and capital of a district; 126 miles S.E. of Lassa. N. lat.  $27^{\circ} 53'$ . E. long.  $92^{\circ} 52'$ .

**TACQUET, ANDREW**, in *Biography*, a mathematician, was born at Antwerp in 1611, and having entered into the order of Jesuits in 1629, was a teacher of the languages and mathematics for several years. He died in 1660. Tacquet was the author of several mathematical works, among

E. which

which we may enumerate the following: viz. "Cylindricorum et Annularium, Libri V. Elementa brevi historica Narratione de Ortu et Progressu Matheseos," &c. printed at Venice in 1737, with Whiston's additions; "Arithmetice Theoria et Praxis;" "Theoremata selecta ex Archimede." After his death, several of his treatises were published under the title of "Andree Tacqueti Antverpiensis Opera Mathematica," containing "Astronomiz Lib. VIII.," "Geometrie Practice, Lib. III.," "Architecturæ Militaris, Lib. I.:" distinguished by their perspicuity. Montucla. Gen. Biog.

TACSAL RAKI, in *Geography*, a lake of Thibet, about 36 miles in circumference. N. lat. 32°. E. long. 88° 34'.

TACSANLU, a town of Asiatic Turkey, in Natolia; 23 miles N.N.W. of Kiutajah.

TACSONIA, in *Botany*, Juss. 398, a name of Peruvian origin, given by that author to such species of Passion-flower, as have a tubular elongation of the base of their calyx. See PASSIFLORA.

TACTICS, τακτικη, formed from ταξω, order; the art of disposing forces in form of battle, and of performing the military or naval motions and evolutions. The science of tactics is either *military* or *naval*.

TACTICS, *Military*, comprehend great or general tactics, *la grande tactique* of the French writers, which includes every thing that relates to the order, disposition, and formation of armies, their encampment, and every other circumstance pertaining to stores, baggage, &c.; and also particular or subordinate tactics, more immediately comprising their movements and evolutions. With the former every general officer ought to be thoroughly acquainted; whilst the latter should be well understood by inferior officers and soldiers, and cannot be totally disregarded by those of the former description.

The Greeks were very skilful in this part of the military art; having public professors of it, called *tactici*, who taught and instructed their youth therein. We have an account of the progress of this art among them in Thucydides, Xenophon, and Polybius. Ælian also hath a particular book on this subject; and there is a great deal of it in Arrian, in his History of Alex. M. and in Mauritius, and Leo Imperator.

From the Greeks this art was transmitted to the Romans, among whom it arrived at its highest perfection. Vegetius has given us a compilation and abridgment of authors who have written on this subject; and his work contributed in a considerable degree to the establishment of military discipline in Europe; for which we are greatly indebted to Maurice, prince of Orange, Alexander Farnese, duke of Parma, Coligny, Henry IV. Gustavus Adolphus, &c.

Vossius, De Scient. Mathemat. mentions twenty-four ancient authors on the subject of tactics.

It does not appear what was the field-exercise of the infantry in our ancient armies. After the Revolution, our system of discipline was chiefly taken from the Dutch, who, under prince Maurice, were the best regulated troops in Europe. Previously to this, the Spaniards were reckoned to have the best disciplined infantry. The exercise was, at the commencement of the last century, and for many years afterwards, encumbered with a number of useless motions. The manner in which the soldiers were armed, with their heavy muskets, bandoliers, &c. obliged them to make wide motions, and to draw up with very extended ranks and files. For an account of the exercise and evolutions of the infantry and cavalry at this period, we refer to Grose's *Military Antiquities*, vol. i. Of late, great alterations have taken place in the field-exercise and manœuvres both of the cavalry and the infantry. Most of the dragoon regi-

ments have been made light; and a new sword-exercise has been adopted for the cavalry. The whole system of the army has been rendered uniform, by regulations issued from the adjutant-general's office. Within the last 60 or 70 years, the British infantry has been gradually falling into the Prussian system; and the new regulations are almost wholly founded on the Prussian institution. For the particulars, the reader is referred to the "Rules and Regulations for the Formation, Field-exercise, and Movements of his Majesty's Forces," and the articles *MANUAL Exercise* and *BATTALION*.

The subject of this article has been already discussed under the following heads; viz. *ARMY, BATTALION, BATTLE, Order of BATTLE, CAMP, CAMPAIGN, CASTRAMETATION, COLUMN, ENGAGEMENT, EVOLUTION, EXERCISE, LINE, PHALANX*, in which order the Gauls and other nations fought in the time of the Romans, and which order still prevails, under some disadvantages, throughout Europe; *WAR, &c. &c.*; so that we have here little to add.

We shall here observe, that the principal object of the Prussian tactics under Frederick the Great was that of concentrating forces, and attacking the chief points of the enemy, not at one time, but one after another; whereas the tactics which have been uniformly pursued by the French, since the commencement of their revolution, have been founded on the principle of attacking all points with divided forces at the same time; thus extending their force, whilst that of the Prussian was compressed.

TACTICS, *Naval or Maritime*, comprehend the orders and signals which are directed to be observed by fleets preparing for action or actually engaged, together with the manœuvres and modes of attack that are then to be practised, and also a knowledge of the rates of ships, their various appendages, and the mode of constructing them. Of this branch of tactics, a copious account will be found under several articles, particularly *BATTLE, ENGAGEMENT, EXERCISE*, and *LINE of Battle*, under which last article we have referred to Clerk's (not Clarke's) *Essay on Naval Tactics*, of which a second edition was published in 1804, which those who are desirous of information on the various modes of attack to windward and leeward, and by cutting the line, will consult; but which does not admit of abridgment within the limits that we are under the necessity of prescribing to ourselves.

TACTICS is also used for the art of inventing and making machines for throwing of darts, arrows, stones, fire-balls, &c. by means of slings, bows, and counterpoises. Vegetius, Hiero, &c. have written on these machines; and we have them described and figured by Lipsius.

TACTILE, or TANGIBLE, in the *Schools*, something that may fall under the sense of feeling.

Though atoms be corporeal, yet are they not either tactile or visible, by reason of their smallness.

The principal tangible qualities are, heat, cold, dryness, hardness, and humidity. See *HEAT, &c.*

TACTION. See *FEELING*.

TACTION, in *Geometry*. See *TANGENT*.

TACTUS, the *Touch*, in *Midwifery*, is the exploration of the state of the vagina and uterus, and of the situation of the fœtus, and whatever else is contained in it. Hippocrates, in his *Treatise on the Diseases of Women*, has been very full and exact in his directions upon this subject.

TACTUS, *Tact*, in *Music*, before the use of bars, implied nearly the same thing as a bar: that is, the time when the hand or foot is beaten down in marking the measure. *Tatto*, Ital., the same.

TACUA,

TACUA, in *Ancient Geography*, a river of Italy, in Liguria, E. of Rutuba.

TACUA, in *Geography*, a town of Peru, in the diocese of Arequipa; 20 miles E. of Arica.

TACUBA, a town of Mexico, N.W. of the city of Mexico.

TACUMADARS, or TIGUMEDES, a town of Africa, in the country of Darah, the original country of the reigning sherifs of Morocco.

TACZLI, a river of European Turkey, which runs into the Danube, near Kilia, in Bessarabia.

TADAPOLLY, a town of Hindoostan, in Myfore; 5 miles S.E. of Sattimungulum.

TADCASTER, a market-town in the West Riding of the county of York, England, is nine miles S.W. from the city of York, and 190 miles N. of London. In the year 1811, it contained 382 houses, and 1483 inhabitants. The name of this place implies a Roman station, and accordingly we find, that the Calcaria of Antoninus was situated on the course of a Roman road, between Eboracum or York, and Mancunium or Manchester, at nine miles distance from the former; and this agrees with the site of the present town. Dodsworth and some other antiquaries, however, place the Calcaria at Newton-Kyme, about a mile and a half W. of Tadcaster. Horsley in "*Britannia Romana*," and Drake in "*Eboracum*," are decisive in fixing the Roman station at Tadcaster. It appears that many Roman coins have been found here: some banks and ditches surround the town, and on the south side of the river are remains of intrenchments, called the Castle. A considerable quantity of stone was taken from this fortress to build a bridge over the river Wharf at the beginning of the 18th century. This bridge is generally described as a very fine structure; and its centre marks the union of the West Riding of the county, with the Ainsty of York and liberty of St. Peter. Tadcaster has a weekly market on Wednesdays, and four annual fairs.

Tadcaster and its vicinity have been twice distinguished and annoyed by the destructive effects of civil warfare: first in the conflicts between the houses of York and Lancaster: and secondly, between the royalists and the republicans, about the middle of the 17th century. On the former occasion, it is related, that between 30,000 and 40,000 Englishmen "fell in deciding the question, whether a tyrant or an ideot should be their master." After Edward IV. had been proclaimed in London, Margaret of Anjou, wife of Henry VI., raised an army, in the north, of about 60,000 men, all attached to the Lancastrian interests. These were assembled at York. When Edward with his army arrived at Pontefract, several skirmishes soon took place on the banks of the Aire, and on Palm-Sunday, 29th March, 1461, the memorable and fatal battle of Towton ensued. On this day it is said, that Henry's army consisted of 60,000 men, and Edward's of about 48,600. These commenced an engagement early in the morning, and fought with great fury during the whole day, with various degrees of success. At length, however, Henry's soldiers fell back, whilst Edward impelled his forward with increased impetuosity. Many of the former were drowned, and several noblemen were slain, whilst Henry and Margaret fled into Scotland. Edward and his soldiers retired to York, and afterwards went to London, where the new monarch was crowned. In the year 1642 another battle occurred at or near Tadcaster. Sir Thomas Fairfax, with about 700 men, occupied this town in behalf of the Parliament, and were attacked by the royal army under the earl of Newcastle. After fighting a whole day,

the former retreated during the night, and left the royalists in possession of the place.

About five miles S.E. of Tadcaster is Scarthingwell-Hall, the seat of lord Hawke, who has paid particular attention to agricultural improvements; and has fitted up a farm with every convenient and useful accommodation. (See *Agricultural Survey of the West Riding of the County of York*.) Three miles south of the town is Haslewood-Hall, the seat of the Vavalours, distinguished for the fineness of its scenery, and the variety and beauty of the prospects from its grounds. Bramham Park, the seat of James Lane Fox, esq., is about four miles S.W. from Tadcaster. —Drake's *Eboracum*, fol. 1736. *Beauties of England*, Yorkshire, by J. Bigland, 8vo., 1815. Hargrove's *History*, &c. of *Knareborough*, 6th edit. 1809.

TADCUL, a town of Hindoostan, in Myfore; 6 miles S.E. of Caveripatam.

TADEMERI, a town of Hindoostan, in Myfore; 100 miles N.E. of Chittledroog. N. lat. 14° 35'. E. long. 78°.

TADEN, a town of the duchy of Holstein; 14 miles E. of Meldorp.

TADPATRY, a town of Hindoostan, in the circar of Cuddapa; 24 miles N. of Gandicotta.

TADIPOODY, a town of Hindoostan, in Golconda; 20 miles S.E. of Combamet.

TADIVAN, or TADUAN, a town of Persia, in the province of Farsistan, situated on a pleasant plain, in the midst of streams, which descend from the neighbouring mountains, and planted with a variety of excellent fruit-trees; 60 miles S. of Schiras.

TADMOR. See PALMYRA.

TADORNA, the *Anas tadorna* of Linnæus, in *Ornithology*, a name given by many authors to a species of duck, called by others *vulpanfer*, and in English the *shiel-drake*, or *borough-duck*; and by some the *bergander*. See DUCK.

It is of a middle size between the duck and goose; its beak is broad, short, and red; and at the origin of the upper chop there is a large red tubercle of flesh; the head and upper part of the neck are of a fine blackish-green, the lower part of the neck white; the breast and upper part of the back surrounded with a broad band of bright orange-bay; the coverts of the wings and middle of the back are white; the nearest scapulars black, the others white; the greatest quill-feathers black; the exterior webs of the next are of a fine green, and those of the three succeeding orange; the coverts of the tail white, and the tail of the same colour, except the two outmost feathers, which are tipped with black; the belly white, divided lengthways by a black line; the legs are of a pale flesh-colour.

They inhabit the sea-coasts, and build in deserted rabbit-holes; but their flesh is not well tasted.

When a person attempts to take their young, they divert his attention by flying along the ground as if wounded, till the brood are secure, and then return and collect them together. Turner, therefore, concludes, that this bird is the chenalopex, or fox-goose of the ancients; and the natives of the Orkneys at this day call it the *fly-goose*.

These birds lay 15 or 16 white roundish eggs. In winter they collect in large flocks. Ray and Pennant.

TADOUN, or TADIVAN, in *Geography*, a town of Asiatic Turkey, in Armenia, situated on the west coast of the lake of Van, having a harbour for boats; 120 miles S.S.E. of Erzerum.

TADOUSAC, a town of Lower Canada, at the mouth of the Saguenay, on the left side of the river St. Lawrence.

The native Indians resort hither to exchange furs for cloth, and other European goods. It was first settled by the French, taken by the English in 1629, retaken by the French in 1633, and it was ceded with the rest of Canada; 100 miles N.E. of Quebec. N. lat. 48° 5'. W. long. 69° 40'.

**TADPOLE.** The animal called by this name is no other than the frog in its first state from the spawn; and this creature furnishes the curious in microscopic observations with a beautiful view of the circulation of the blood, especially when young.

The method of procuring them for this purpose in the greatest perfection, is this: let a small quantity of frog's spawn be kept for some days in water, and from this will be produced a vast number of young tadpoles; these, while very young, are perfectly transparent, and when placed before the double microscope, the heart may be easily seen, and its pulsation regularly observed; and the blood protruded thence may be beautifully seen circulating through the whole body; but particularly in the tail, where, though so very minute, more than fifty vessels may be seen at one view. The young brood grow more and more opaque every hour, and in a day or two the circulation of the blood can only be seen in their tail, or in the fins near the head. Baker's *Microscope*, p. 126.

**TÆDA**, in *Pharmacy*, a term used by some authors to express certain compositions made up in form of troches. These are sometimes meant as pessaries to be introduced into the vagina, and therefore made into this form; sometimes they are compositions of fragrant or other ingredients for fumigations.

**TÆDA**, in *Botany*, a name given by some authors to the pinaster, or common wild pine, or mountain-pine.

**TÆL.** See **TALÆ**.

**TÆNARIA**, *τανάρια*, in *Antiquity*, a festival in honour of Neptune, surnamed *Tanarius*, from *Tanarus*, a promontory in Laconia, where he had a temple.

**TÆNARIA**, or *Tenarium*, now *Cape Matapan*, in *Ancient Geography*, a promontory of the Peloponnesus, S. of Laconia, between the gulf of Messenia and that of Laconia. Here were formerly a grotto, and a temple of Neptune, which rendered the place very famous, so that it was reckoned to be one of the mouths of hell, through which Hercules and Psyche descended thither. The temple was accounted an inviolable asylum. On this promontory there were also a statue of Arion, seated on a dolphin, and playing on the lyre, and a fountain of wonderful efficacy.

**TÆNARIUM**, a town of the Peloponnesus, upon the promontory above described.

**TÆNARIUM Marmor**, the name of a marble used by the ancient architects and statuaries. There were two kinds of it, very different in colour, but perfectly agreeing in hardness, and in the high polish they are capable of. The first, or most frequent kind, was black, and was dug from the promontory called *Tanarus*, in the Lacedæmonian state; the other, which was more scarce, and much more beautiful, was of a green colour, with a cast of yellow; this was dug in the Tagetan quarries, and was called by some *marmor herkosum*, and *xanthum*.

**TÆNIA**, or **TENIA**, in *Architecture*, a member of the Doric architrave, resembling a square fillet, or reglet; and serving in lieu of a cymatium.

The word is Greek, *τανίαι*, which literally denotes a *swathe*, *bandage*, *fillet*, or the like. Barbo renders it by *listel*, but Palladio uses the old name *tania*.

Leon Baptista Alberti calls the *tania*, *regule*, and *fif-*

*ciola*; and Daviler, *bandelettes*. Philander says, there are two kinds, *viz.* that above-mentioned, which he calls the *lower*; and an *upper*, which serves for a capital to the triglyphs.

**TÆNIA**, in *Ichthyology*, the name of a fish of the anguilliform, or eel-shaped kind, common in the Mediterranean sea, and brought to market in Italy and elsewhere. This is a species of cepola in the Linnæan system. See **CEPOLA**.

**TÆNIA Corauta**, the *horned tania*, a name given by many authors to the species of cobitis, named by Artedi, the cobitis with a forked prickle placed under each eye. This fish is the *cobitis tania* of Linnæus. See **COBITIS**.

**TÆNIA**, in *Zoology*, a genus of the Intestina order of worms; the characters of which are, that the body is flat and articulated, and that the head is furnished with four sucking bladders. Gmelin, in his edition of the Linnæan system, enumerates eighty-six species, besides several varieties. Their habitations are the viscera of men and of different animals. Our limits will not allow us to specify and describe them. For an account of the *tænia* intestinorum of the human body, or *lumbricus latus*, we refer to **TAPE-WORM**.

**TÆNIOLONGA**, in *Ancient Geography*, a town of Africa, in Mauritania Tingitana, upon the Iberian sea. *Ptol.*

**TÆNITIS**, in *Botany, from *τανίαι*, a ribband, or *fillet*, because of the long narrow shape of the frond.—Swartz *Fil.* 24. Willd. *Sp. Pl.* v. 5. 135.—Class and order, *Cryptogamia Filices*. Nat. Ord. *Filices*.*

Ell. Ch. Sorus linear, nearly uninterrupted, longitudinal, between the rib and outer margin of the frond. Involucrum none.

1. *T. blechnoides*. Pinnate Tape-fern. Swartz *Fil.* 220. Willd. n. 1. ("T. pteroides; Selkuhr *Crypt.* 21. t. 6." Sprengel *Crypt.* 411. t. 10. f. 106. *Pteris blechnoides*; Willd. *Phytogr.* 13. t. 9. f. 2.)—Frond pinnate; leaflets linear-lanceolate, tapering at each end, entire, smooth.—Native of the East Indies. The whole frond is from eighteen to twenty-four inches, or more in height, smooth, with a smooth, furrowed, bluntly angular stalk. Leaflets opposite, the lower ones occasionally alternate, five or six pair, equal, about five inches long, and half an inch wide in the middle. Line of *fructification* on each side of the mid-rib, about half way between it and the margin. We must rely on the authors cited as to the absence of an *involucrum*. See **SORUS**.

2. *T. furcata*. Forked Tape-fern. Willd. n. 2. (*Pteris furcata*; Linn. *Sp. Pl.* 1531. Swartz *Fil.* 95. *Lingua cervina furcata*; Plum. *Fil.* 122. t. 141. *Phyllitis aspera*, *furcis lineatis*; Petiv. *Fil.* n. 125. t. 6. f. 6.)—Frond simple, repeatedly forked, linear-lanceolate, acute, wavy; scaly beneath.—Gathered by Plumier in the woods of Hispaniola. No other botanist appears to have even seen a specimen. The root is tufted, scaly, bearing several fronds about a foot high, leafy to the very base, once or twice forked, and rather spreading, of a very thin membranous texture; of a fine green, and very smooth, in front; paler at the back, clothed with reddish pointed scales, and furnished with a black shining rib. The *fructification* is stationed in a *serot*, or line, two or three inches long, on each side of the rib, but nearer the margin, in the upper part of each very acute lobe of the frond, the margin in that part being even, not wavy. The want of an *involucrum* is only presumed from Plumier's figure, nor do we esteem the generic character, of this species at least, to be very certain.

Dr. Swartz hints at another possible species, the *Blechnum feminudum*, Willd. *Phytogr.* 13. t. 8. f. 2. But if it be so, the

The genus can have little pretensions to be esteemed natural; and as Willdenow himself has not subsequently followed this hint, we presume he thought it unauthorized by his own specimen, which has the aspect of a confluent *Grammitis*.

TAENSAPAVA, in *Geography*, a river of West Florida, which runs into the Ibberville, N. lat.  $30^{\circ} 19'$ . W. long.  $10^{\circ} 12'$ .

TAFALE, a river of Africa, which runs into the sea, between the rivers Senegal and Nunez.

TAFALISGA, a town of Africa, in the kingdom of Jaaga, at the union of the Falema with the Senegal. N. lat.  $14^{\circ} 42'$ . W. long.  $10^{\circ} 12'$ .

TAFALLA, a town of Spain, in Navarre, honoured with the name of city by Philip IV. It has an university; 15 miles S. of Pamplona. N. lat.  $42^{\circ} 35'$ . W. long.  $1^{\circ} 43'$ .

TAFARA, a town of Africa, in the kingdom of Bambarra, on the Niger; 115 miles S.W. of Sego.

TAFELALAT, a town of Africa, in Sahara; 200 miles N. of Tombuctoo. N. lat.  $19^{\circ} 40'$ . E. long.  $2^{\circ} 15'$ .

TAFELBERG, a town on the E. coast of the island of Ceram. S. lat.  $3^{\circ} 20'$ . E. long.  $131^{\circ} 10'$ .

TAFELICHTE, a mountain on the borders of Lusatia, 3540 feet above the level of the sea.

TAFFAREL, or TAFF-RAIL, in *Ship-Building*, the upper part of a ship's stern, usually ornamented with carved work, or mouldings, the ends of which unite with the quarter-pieces.

TAFFAROWY, in *Geography*, a mountain of Algiers; 13 miles S.E. of Oram.

TAFFETY, or TAFFATY, in *Commerce*, a kind of fine, smooth, silken stuff; having, usually, a remarkable lustre, or gloss.

*Alamode*, } the *taffetas noirs* of Lyons.

*Lustring*, }

*Taffetas noir lustre* of the French, is our *alamode*.

*Non lustre* is our *lustring*.

There are taffeties of all colours; some plain, others striped with gold, silver, silk, &c. others checquered, others flowered, others in the Chinese point, others the Hungarian; with various others to which the mode, or the caprice of the workmen, gives such whimsical names, that it would be as difficult, as it is useless, to rehearse them: besides, that they seldom hold beyond the year in which they first rose. The old names of taffeties, and which still subsist, are, taffeties of Lyons, of Spain, of England, of Florence, of Avignon, &c.

The chief consumption of taffeties is in the summer-dresses for women, in gowns, linings, window-curtains, &c.

There are three things which contribute chiefly to the perfection of taffeties, *viz.* the silk, the water, and the fire. The silk is not only to be of the finest kind, but it must be worked a long time, and very much before it be used: the watering is only to be given very lightly, and seems only intended to give that fine lustre, by a peculiar property not found in all water: lastly, the fire, which is passed under it to dry the water, has its particular manner of application, on which the perfection of the stuff depends very much.

Octavio May, of Lyons, is held the first founder of the manufacture of glossy taffeties; and tradition tells us the occasion of it. Octavio, it seems, going backwards in the world, and not able to retrieve himself by the manufacture of taffeties, such as were then made, was one day musing on his misfortunes, and, in musing, chanced to chew a few hairs of silk which he had in his mouth: his reverie being over, the silk he spit out seemed to shine, and, on that account, engaged his attention. He was soon led to reflect on the reason; and, after a good deal of thought, concluded,

that the lustre of that silk must come, 1. From his having pressed it between his teeth. 2. From his having wetted it with his saliva, which had something glutinous in it. And, 3. From its having been heated by the natural warmth of his mouth. All this he executed upon the next taffeties he made, and immediately acquired immense riches to himself, and to the city of Lyons the reputation it still maintains, of giving the gloss to taffeties better than any other city in the world.

It will not, we conceive, be less useful than curious, to insert here the description of the engine contrived by Octavio to give the gloss to taffety; and to add the manner of applying it, and the composition of the water used in it.

The machine is much like a silk-loom, except that, instead of iron points, here is used a kind of crooked needles, to prevent the taffety from slipping: at the two extremities are two beams, on one of which is rolled the taffety to take the gloss; and on the other, the same taffety, as fast as it has received it. The first beam is kept firm by a weight of about two hundred pounds, and the other turned by means of a little lever passing through mortises at each end. The more the taffety is stretched, the greater lustre it takes: care, however, is to be used that it be not weakened by over-stretching.

Besides this instrument for keeping the stuff stretched, there is another to give it the fire: this is a kind of carriage, in form of a long square, and of the breadth of the taffeties: it moves on trundles, and carries a charcoal fire under the taffety, at the distance of about half a foot.

These two machines prepared, and the taffety mounted, the lustre is given it by rubbing it gently with a ball, or a handful of lints of fine cloth, as it rolls from one beam to the other; the fire, at the same time, being carried underneath it to dry it. As soon as the piece has its lustre, it is put on new beams to be stretched a day or two; and the oftener this last preparation is repeated, the more it increases the gloss.

For black taffeties, the gloss is given with double beer and orange or lemon-juice; but this last is the least proper, as being apt to whiten them. The proportion of the two liquors is, a gallon of orange-juice to a pint of beer, to be boiled together to the consistence of a rich broth. For coloured taffeties, they use gourd-water distilled in an alembic.

There are also several different sorts of taffeties manufactured in China; as corded taffeties, which wear well; and also some with flowers, and others beautifully striped; and a particular taffety, of which they make drawers, and other kinds of wearing apparel. This last is thick, and yet so pliant, that it may be folded and pressed with the hand, without leaving any mark in it. They also wash it, like other stuffs, without its losing much of its lustre. The Chinese workmen give the lustre to this taffety with the fat of the river-porpoise, which they purify by washing and boiling; and then with a fine brush, they give the taffety two beds in the same direction, on the side which they intend to render glossy.

TAFFI, ANDREA, in *Biography*, was one of those early masters to whom the revival of the arts in Italy is attributed. His share lay in the practice of mosaic painting, which he learned of a Greek monk, named Apollonius, who had been called to Venice to work in the great church of St. Marco; and who afterwards accompanied Taffi to Florence. Andrea was born at Florence in the year 1213, and died there at the age of 81.

TAFILET, or TAFIILT, in *Geography*, a district, formerly a kingdom of Africa, in the empire of Morocco, and country

country of Biledulgerid, extending along the east side of mount Atlas; the habitations of which are about 1500 scattered houses, and of these several are defended by a tower, and each of them stands amidst an inclosure of gardens, cultivated grounds, and plantations of palm-trees, forming a variegated and pleasant country, intersected by many rivers and rivulets, descending from the east of mount Atlas, and serving to water their lands. Tafilet, as well as Draha, produces a superior breed of goats, and a great abundance of dates, which are small, but good, constituting the wealth of the country, and supplying food for the people, and even for the cattle. Although the Koran prohibits the use of spirituous liquors, yet by ancient custom, brandy is made at Tafilet of dates, which is very strong, and drunk so immoderately by the sherifs, that wine produces no effect upon them. Most of these sherifs are poor, and employ themselves in their grounds and gardens, and very frequently pillage one another. The countries situated near the banks of the rivers of Draha and Tafilet have several plantations of Indian corn, rice, and indigo. The town of Tafilet, after which the kingdom was named under the sherifs of the reigning house, is not an ancient city. It derives its name from the word "Fileli," which denominates the inhabitants of the country, and also the stuffs and carpets which are here manufactured. The soil of the extensive plain on which it is situated is a whitish clay, which when moistened resembles soap; and though it passes a river that rises in the Atlas, and pursues a course from the S.W. to the N.E., being at Tafilet about as wide as the Thames at Putney, its water, traversing the saline plains, is brackish: after a course of about 450 miles, it is absorbed in the desert of Angad. It has several castles of tarrace on its banks, inhabited by the sherifs or princes of the reigning family of Morocco. Wheat and barley have been lately cultivated near the river and the castles. Another river of inferior note rises in the plains N. of Tafilet, and flowing in a southerly direction, is absorbed in the Great Desert or Sahara. The water of this river is also brackish, and unfit for culinary purposes. The inhabitants of this country, it is said, possess such a sense of honour, that a robbery is scarcely known among them, though they use no locks. Commercial transactions are carried on amongst them by barter or exchange, so that they have little specie; but in all transactions of magnitude, gold-dust is the circulating medium. They live in the simple patriarchal manner of the Arabs, differing from them only in having walled habitations, which are invariably near the river. The climate during a great part of the year is intensely hot, and the shume, or hot wind from Sahara, blowing tempestuously in July, August, and September, and carrying with it particles of earth and sand, is very pernicious to the eyes of the inhabitants. A considerable trade is carried on from Tafilet to Tombuctoo, Houssa, and Jimme, S. of Sahara, and also to Morocco, Fez, Sufe, Algiers, Tunis, and Tripoli. Indigo abounds, but by reason of the indolence of the cultivators, it is of inferior quality. Here are also mines of antimony and lead-ore. The common dress consists of a loose shirt of blue cotton, with a shawl or belt round the waist. A caravan passes annually from hence to Tombuctoo. Woollen haks, of a curious texture, being light and fine, are manufactured here. The Tafilet goats are very prolific, and afford a rich milk in great abundance: and therefore they constitute an article of considerable export. The Tafilet leather is very soft and fine, and much superior to that of Morocco: it is as soft and pliable as silk, and impervious to water. The tanners use the leaves of a shrub called tãra, which grows in the Atlas mountains, to which some have ascribed the peculiar quality of

the leather; though others ascribe it to some quality in the air and water. The population of the district of Tafilet is stated by Mr. Jackson at 650,000. The town is 140 miles E.S.E. of Morocco. N. lat. 31° 20'. W. long. 6°.

TAFNA, a river of Algiers, which runs into the Mediterranean, near Tackumbreet.

TAFU, or TAFU, a town of Africa, on the Gold Coast.

TAG, or TAGGE, in *Rural Economy*. See TEG.

TAG, or *Tag-Sore*, a disease in sheep, which consists, as stated in a paper in the third volume of the "Transactions of the Highland Society of Scotland," of scabs and sores situated on the under side of the tail; arising, in warm weather, from its being fouled with purging and other discharges. The matter hardens there, irritates the tender vessels, and produces sores, which, if not attended to, run into mortification, and prove fatal, as in the legs. See SWELLING or *Leg-Evil*.

It is shewn by the sheep turning frequently round to bite the tail.

As this complaint arises principally from purging, and the nastiness caused by it, &c. the first thing to be done is the restraining and cure of this evacuation: after which the tail of the animal is to be clipped, and the sore part laid bare, washed carefully with milk and water, blood-warm, and then with lime-water. The sheep is then to be turned out into a dry pasture, and looked at again in two or three days, and if not then well, the washing must be repeated, and the parts anointed with grease and tar mixed together in equal proportions.

TAGABONA, in *Geography*, a river of West Florida, which runs into the St. Mark, N. lat. 30° 22'. W. long. 84° 34'.

TAGADEMPT, TAGADEONT, or *Tigedent*, a town of Algiers, anciently called *Vaga*; 60 miles E.S.E. of Oran.

TAGÆ, in *Ancient Geography*, a town of Asia, in Parthia, near the river Oxus, and on the confines of Hyrcania.

TAGAI, in *Geography*, a town of Russia, in the government of Simbirsk; 48 miles W. of Simbirsk. N. lat. 54° 20'. E. long. 47°.

TAGAL, a town of the island of Java, on the N. coast, the residence of a Dutch agent for the purchase of rice; 35 miles E. of Cheribon.

TAGALA, *Tā-Gāla*, or *Gala* language, is among the Philippines what the Malayu is in the Malay islands, or the Hindostani in Hindostan Proper. It possesses the combined advantages of the four principal languages in the world: it is mysterious as the Hebrew; it has articles for nouns, both appellative and proper, like the Greek; it is elegant and copious as the Latin; and equal to the Italian, as the language of compliment or business. This language has been cultivated only by the Spanish missionaries. The Tagala grammar of Fra. Gaspar de San Augullin, was printed in 1763, and again in 1787. The alphabet consists of seventeen letters, three of which are vowels, and fourteen consonants. The Tagala characters are said to have been derived from the Malays, and they are read with as much difficulty as the ease with which they are written. This Tagala is written with an iron style on bamboos and palm-leaves, and the Spanish missionaries assert, that the ancient mode of writing was from top to bottom, like the Chinese. This language, with a considerable number of peculiar vocabularies, and great singularity of idiom, is nevertheless to be considered as a cognate language with Malayu, Bujis, and Javanese. Few languages, on a cursory examination, present a greater appearance of originality than the Tagala.

For

For a farther account of it, we refer to Dr. Leyden's Essay on the "Languages and Literature of the Indo-Chinese Nations," in the Asiatic Researches, vol. x.

**TAGALAZ**, in *Geography*, one of the Fox islands, in the North Pacific ocean. N. lat. 53° 30'. E. long. 185° 26'.

**TAGAMA**, in *Ancient Geography*, a town of Africa, in the interior of Libya, upon the bank of the Niger. Ptol.

**TAGAMA**, in *Geography*, a country of Africa, in Nigritia. W. of Cassina.

**TAGANROG**, a fort of Russia, on the sea of Azoph, first built by Peter the Great in 1696; 32 miles W.N.W. of Azof.

Taganrog is situated upon the cliff of a very lofty promontory, commanding an extensive prospect of the sea of Azof, and the whole European coast to the mouths of the Don. The number of inhabitants does not at present exceed 5000. The mole in the haven is so shallow, that ships performing quarantine lie off at the distance of 10 miles, and all vessels drawing from 9 to 10 feet of water cannot approach nearer to the town than this distance. This town has sunk into decay; and all the best houses are in its suburbs. If it had water, its situation is very favourable for commerce; but it can be carried on here only for three months in the year. In the winter the sea is frozen. Here are three fairs in the year. The fish caught in great abundance in the sea of Azof is dried and sent over all the south of Russia. Fruit is brought from Turkey, such as figs, raisins, and oranges; Greek wine from the Archipelago, with incense, coffee, silk, shawls, tobacco, and precious stones. Copper of a very inferior quality comes from Trebizond, and is forwarded to Moscow. Among the principal exports are caviare, butter, leather, tallow, corn, fur, canvas, rigging, lines, wool, hemp, and iron. The greatest advantage this town enjoys is its being the depository of Siberian productions. The Calmucks form large settlements in the vicinity of Taganrog. It is the resort of people from a great variety of countries; inasmuch that the inhabitants of fifteen different countries have been observed in this place at the same time.

**TAGAPOLA**, a small island among the Philippines; 25 miles W. of the island of Samar.

**TAGARA**, an ancient city of India, known to the Greeks about 2050 years ago. Arrian, in his Periplus Maris Erythraei, says that it was a large city, and all kinds of mercantile goods throughout the Deccan were brought hither, and hence conveyed in carts to Baroach, or Barygaza. Arrian also informs us that Tagara was situated at about 10 days' journey E. of another famous mart, called Pluthana, or Pluthana; that Pluthana was 20 days' journey S. of Baroach; and that the road to it was through the Bala-gaut mountains. Pluthana, now called Pultanah, is situated on the southern bank of the Godavery, about 217 British miles to the southward of Baroach. If we divide these 217 miles by 20, the number of days travellers spent in passing from between Pultanah and Baroach, according to Arrian, we shall have nearly 11 miles *per* day, or 5 cofs, which is the usual rate of travelling with heavy loaded carts. Arrian informs us, that Tagara was about 10 days' journey W. of Pultanah. Allowing these 10 days to be equal to about 100 British miles, Tagara, by its bearing and distance from Pultanah, falls at Deoghire, or Deogire (which see), a place of great antiquity, and famous through all India, on account of the pagodas of Eloura. It is now called Dowlatabad, and about four cofs N.W. of Aurungabad. It appears in Arrian's Periplus, that on the arrival of the Greeks

into the Deccan, above 2000 years ago, Tagara was the metropolis of a large district called Ariaca, which comprehended the greatest part of subah Aurungabad, and the southern part of Concan. About the middle of the first century, Tagara was no longer the capital of Ariaca, rajah Salbahan having removed the seat of the empire to Pattan. However, the rajahs, headed by Salbahan, having revolted, they gave him battle, and he was slain. Tagara became again the metropolis of Ariaca; at least this was the case towards the latter end of the eleventh century. When the Mussulmans carried their arms into the Deccan, about the year 1293, Tagara or Deoghir was still the residence of a powerful rajah, and remained so till the time of Shah-Jehan, when the district belonging to it became a subah of the Mogul empire. Thus Tagara was deserted, and Kerkhi, four cofs S.E. of it, became the capital, now called Aurungabad. Thus the ancient kingdom or rajahship of Tagara was destroyed, after it had existed, with little interruption, above 2000 years. Asiatic Researches, vol. i.

**TAGASA**, a town of Fez, seated on a river about three leagues from the Mediterranean; 20 miles W. of Melilla.

**TAGASTA**, in *Ancient Geography*, a town of Africa, in Numidia, on the route from Hippone to Casarea. Anton. Itin.

**TAGAVAST**, in *Geography*. See TAGOAST.

**TAGAZEE**, a town of Africa, on the road from Mourzouk to Agades; 260 miles S. of Mourzouk. N. lat. 23° 32'. E. long. 12° 55'.

**TAGAZOUTE**, a town of Algiers; 45 miles S.E. of Oran.

**TAGEBACHI**, an island in the Red sea. N. lat. 25° 2'.

**TAGETES**, in *Botany*, a name which Fuchsius tells us is applied by Apuleius to the Tanfy, but which he himself adopts for a plant, not very dissimilar in foliage, now vulgarly called the French, or African, Marygold. He is followed by Dillenius, Linnaeus, and every subsequent writer. De Theis derives the word from Tages, an Etruscan deity, grandson of Jupiter, and teacher of divination; and supposes the beauty of its flowers may have procured the plant this mythological appellation. Of this intention we can find no traces in the above writers.—Linn. Gen. 430. Schreb. 561. Willd. Sp. Pl. v. 3. 2126. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 88. Tourn. t. 278. Juss. 182. Lamarek Illustr. t. 684. Gærtn. t. 172.—Class and order, *Syngenesia Polygamia-superflua*. Nat. Ord. *Compositæ oppositifoliae*, Linn. *Corymbiferae*, Juss.

Gen. Ch. *Common calyx* perfectly simple, of one leaf, tubular, oblong, with about five teeth, and as many longitudinal angles. *Cor.* compound, radiant. Florets of the elevated disk numerous, all perfect, tubular, longer than the calyx, erect, cut half way down into five linear segments, villous at the inside: those of the radius five, ligulate, female, longer than those of the disk, their limb almost as broad as long, very obtuse, contracted and downy towards the tube, permanent. *Stam.* in the perfect florets, Filaments five, capillary, very short; anthers united into a cylindrical tube. *Pist.* in the perfect florets, Germen oblong; style thread-shaped, the length of the filaments; stigma divided, slender, reflexed. *Peric.* none, the calyx remaining unchanged. *Seeds*, to both kinds of florets, solitary, linear, compressed, rather shorter than the calyx; crowned with five, more or less, erect, pointed, unequal scales. *Recept.* naked, small, flat.

Obf. In a cultivated state, the two common garden species have usually, from luxuriance, more segments in the calyx,

## TAGETES.

calyx, and more florets in the radius, than is natural; one of these luxuriant flowers is what Gartner has delineated. Some more recently discovered species, on the other hand, have naturally but three or four radiant florets.

Eff. Ch. Receptacle naked. Seed-down of several erect pointed scales. Calyx simple, of one leaf, tubular, with five teeth. Florets of the radius five, permanent.

1. *T. patula*. French Marygold. Linn. Sp. Pl. 1249. Willd. n. 2. Ait. n. 2. Loureir Cochinch. 504. Curt. Mag. t. 150. (Flos aphricanus minor, simplici flore; Ger. Em. 750. Caryophyllus indicus minor; Camer. Epit. 407.)

β. *T. minor*, flore fulvo maculato; Dill. Elth. 373. t. 279.—Stem spreading. Leaves pinnate; leaflets lanceolate, with hair-pointed ferratures. Stalks single-flowered, somewhat swelling upwards.—Native of Mexico, from whence it was brought to the gardens of Europe, about the middle of the sixteenth century, and hence dispersed over other countries, being now, according to Loureiro, commonly cultivated in Cochinchina, China, and various parts of India. With us it is a tender annual, raised on a hot-bed in spring; and being planted out after midsummer, decorates almost every garden throughout the autumn. Its appellations of French Marygold, and African Flower, are altogether founded in error. The stem is about a foot or 18 inches high, branched and widely spreading. Leaves opposite, of five or six pair of dark green shining leaflets, with an odd one; all gradually smaller downwards. Flowers about two inches in diameter, yellow, with broad lateral stripes, or spots, to each radiant floret, of a peculiarly rich brown. They vary in size and tints, as well as scent, and are generally more or less double. The plant of Dillenius hardly deserves to be marked as a variety. The herb when bruised is very fetid, acrid, and supposed to be poisonous, though too nauseous to be very dangerous. Few flowers are more striking in appearance.

2. *T. cretita*. African Marygold. Linn. Sp. Pl. 1249. Willd. n. 3. Ait. n. 3. (Flos aphricanus major; Ger. Em. 749. Caryophyllus major indicus; Bess. Elyflet. æst. ord. 14. t. 2. C. indicus; Camer. Epit. 406.)—Stem erect. Leaves pinnate; leaflets lanceolate, with hair-pointed ferratures. Stalks single-flowered, swelling upwards.—Native of Mexico; introduced into the gardens of Europe about the same time as the foregoing, nor is the epithet of African more correctly applied to one than to the other. The same mode of culture suits both, and both are equally common. This species is much the tallest, and grows erect. The leaves are rather paler. Flowers twice as large, of a golden uniform yellow; sometimes orange-coloured. Columna, in his *Ephraisi*, part 2. 47. t. 46, represents a quilled variety, as it is termed, whose radiant florets are funnel-shaped, and another whose florets are all of that sort.

3. *T. elongata*. Long-stalked American Marygold. Willd. n. 4.—Stem erect, nearly simple. Leaves pinnate; leaflets linear, serrated at the end; those of the lower leaves wedge-shaped. Stalks single-flowered, elongated, slightly swelling.—Native of South America. Root annual. Stem from three inches to a span high, either simple, or furnished with a branch or two from the bottom. Leaflets of the lower leaves obovato-lanceolate, serrated at the extremity; those of the upper linear, with a few slightly hair-pointed ferratures at the end. Stalk solitary at the top of the stem or branch, and almost as long as the stem itself. Flower deep yellow, agreeing in form and structure with *T. patula*.

4. *T. minuta*. Small-flowered Chili Marygold. Linn. Sp. Pl. 1250. Willd. n. 5. Ait. n. 4. (*T. multiflora*, minuto flore albicante; Dill. Elth. 374. t. 280.)—Stem

erect, densely paniced. Leaves pinnate; leaflets lanceolate, serrated. Stalks many-flowered, scaly.—Native of Chili. Cultivated in Dr. Sherard's garden, before the year 1728. A hardy annual, flowering in autumn, but seldom preserved in collections. The stem is ten or twelve feet high, covered with leaves, which are smaller than those of the first species. The flowers are very small and pale, forming dense, compound, tufted, erect panicles, at the ends of the branches; their stalks clothed with bristly scales. Calyx cylindrical. Radius of two, three, or four variously lobed florets. This is surely the Chili plant of which Feuillé (quoted by Dillenius) describes two varieties, differing in the number of their radiant florets; and which he says is extremely hot in quality. The Indians eat it to warm themselves after their return from fishing.

5. *T. caracasana*. Long-stalked South American Marygold. Willd. n. 6. (*T. peduncularis*; Cavan. Leccion. 201. n. 494?)—"Stem corymbose, furrowed, erect. Leaves pinnate; leaflets lanceolate, serrated at the end. Stalks elongated, single-flowered, erect. Calyx cylindrical."—Gathered by Baron Humboldt at the Caraccas.—Root annual. Stem corymbose at the top. Leaflets linear-lanceolate, serrated at the end, not fringed. Flowers like those of the next species, on long alternate stalks. Leaflets of the uppermost leaves entire. Willdenow. The plant of Cavanilles was raised in the garden at Madrid, from seeds collected at Cumaná by Bonpland, the companion of the celebrated Humboldt. The stem is described a foot and a half high, furrowed, much branched. Flower-stalks six inches long, tumid near the calyx, leafy in their lower part. Corolla entirely yellow, with six or eight rays shorter than in the following. We find nothing in his account which is not conformable to the plant before us, and should have been glad if we could have adopted his greatly preferable specific name.

6. *T. tenuifolia*. Fine-leaved Peruvian Marygold. Cavan. Ic. v. 2. 54. t. 169. Willd. n. 7. Ait. n. 5.—Stem paniced. Leaves pinnate; leaflets linear, serrated; their lower ferratures elongated. Stalks alternate, single-flowered. Calyx club-shaped.—Native of Peru. Cavanilles. We have specimens from Mutis. Mr. W. Malcolm is said in Hort. Kew. to have cultivated this species in 1797, but being a late-flowering annual, greatly inferior in size and beauty to the popular species of the same genus, it has probably not been preserved. The appearance of the dried specimens is like a starved *T. patula*, with more numerous, much smaller, flowers than usual. The calyx abounds with oblong glandular dots, of which traces are likewise found in that species. The corolla is described of a full unspotted yellow.

7. *T. elliptica*. Oval-leaved Peruvian Marygold.—Stem erect, branched. Leaves pinnate; leaflets elliptical, with shallow ferratures. Stalks corymbose, with lanceolate bracteas.—Native of Peru. We received a dried specimen from the late abbé Cavanilles, in 1804. The stem has a shrubby appearance, and is much branched, leafy and furrowed. Leaflets scarcely visibly serrated, pointed, smooth and even; the lower ones of each leaf gradually smaller, and mostly alternate. Flowers rather numerous, not very much smaller than in *T. patula* when not luxuriant; their partial stalks accompanied by alternate lanceolate bracteas. Calyx marked with scattered, apparently glandular, lines. This is certainly very distinct from all the species we can find described.

8. *T. micrantha*. Small-flowered Mexican Marygold. Cavan. Ic. v. 4. 31. t. 352. Willd. n. 8.—Stem much branched, spreading. Leaves pinnate; leaflets linear-awl-shaped, entire. Stalks axillary, single-flowered.—Gathered by  
Louis

Louis Née, near the town of Querétaro, in New Spain. It flowered in the Madrid garden, in October 1796. *Root* annual. *Stems* hardly a foot high, round, rather woody, smooth like every other part of the plant. The slenderness of the *leaves*, and smallness of the *flowers*, give this species the appearance of a *PECTIS* or *HETEROSPERMUM* (see those articles); but the *calyx* is perfectly simple, tubular, with five furrows and five teeth. *Florets* of the radius two only, whitish and undivided: those of the disk generally five, yellow, scarcely more than four-cleft. *Seeds* long, compressed, each crowned with two bristles, and two intermediate, notched, unequal scales.

9. *T. lucida*. Sweet Chili Marygold. Cavan. Ic. v. 3. 33. t. 264. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 740. Andr. Repof. t. 359.—*Leaves* simple, finely serrated. *Panicle* corymbose.—Native of New Spain. Its seeds were brought to England in 1798, by the late marchioness of Butte, along with many other novelties from the gardens of Madrid. The *root* is perennial, and will endure our ordinary winters, with a slight degree of protection. *Stem* erect, about two feet high, round, striated, leafy, smooth; branched in the upper part. *Leaves* one and a half or two inches long, opposite, on short, broad, combined *footstalks*, elliptic-oblong, smooth, veiny, full of pellucid dots; their lower serratures tipped with bristly points, or hairs. *Panicle* level-topped, many-flowered; its stalks angular, smooth, with linear-lanceolate *bracteas*. *Calyx* half an inch long, besprinkled with glandular dots. *Flowers* of a golden yellow, agreeably scented; their radiant *florets* generally three, very broad. *Seed* crowned with from two to five linear-lanceolate unequal scales. The serratures of the *leaves* are very incorrectly represented in Cavanilles's plate, where they are made to resemble a fringe of fine hairs, which only belongs to the lower ones, and is not expressed in any of the figures hitherto published.

**TAGETES**, in *Gardening*, furnishes plants of the herbaceous annual kind, among which the species mostly cultivated are, the French marygold (*T. patula*), and the African marygold (*T. erecta*).

The first fort has several varieties, as the pale yellow-flowered, deep yellow-flowered, golden yellow-flowered, crimson-coloured, velvety, variegated crimson and yellow, striped crimson and yellow; each of which has both single and double flowers: and there are the large-flowered, small-flowered, sweet-scented, and the dwarf French marygolts.

In the second fort, also, there are varieties; as those with pale yellow or brimstone-coloured flowers, with deep yellow flowers, with orange-coloured flowers; the sweet-scented and the dwarf, &c.; each with single, double, and fistulous flowers; the middling African, with orange-coloured flowers, and the sweet-scented African, and perhaps some others.

*Method of Culture*.—All these plants are increased by seeds, which should be sown in the beginning of April upon a hot-bed; and when the plants appear, they should have plenty of fresh air, and, after they have attained some growth, be transplanted on to another hot-bed, which is arched over by hoops, at the distance of six inches; watering and shading them well till fresh-rooted, being afterwards gradually inured to the open air; and about the beginning of May they may be taken up with balls of earth about their roots, and be planted in pots, to be set out in the courts, yards, &c. about the house, shading them till fresh rooted, and giving them water occasionally. But the first fort divides and spreads out widely near the ground, in a rambling manner, and requires to be trimmed up at bottom to a single stem, and its branches occasionally, to preserve the head somewhat regular, and within due bounds.

In raising them in the open ground, in case of the default of hot-beds and other conveniencies, the seed should not be sown before the beginning of April, when the plants are to be covered and protected in the nights, and in severe weather; and when otherwise, not until the middle or latter end of it, and then in a warm rich situation, either in drills of half an inch in depth, or on the surface, and raked in lightly. After the plants are a few inches high, they should be planted out either finally into the borders and other parts, or, when too small, into nursery-rows for a little time, and then set out where they are to remain.

Two or three plants may be placed nearly together, in patches at five or ten feet distance; and when they show their flowers, so as to judge of their properties, the worst may be cleared away, and one only of the best left to each patch, &c. The same way may be had recourse to in planting in pots, &c.

In the future culture of all these kinds of plants, occasional waterings are necessary, frequently the first and second weeks after planting out, but more seldom afterwards. Those in pots should have it three times in the week constantly, and morning and night in very hot weather.

Stakes are requisite to the strong large-headed plants, one to each. They should also be properly trimmed in their side-branches near the bottom, and the too great ramblers, to produce regularity.

However, the second species in particular, and the varieties of it, as they always grow firmly erect, both in stem and branches, require but very little trouble after their final planting out: they afford ornament and variety, among other plants, in the borders, clumps, and other parts of pleasure-grounds, as well as in pots for particular places about the house, among other potted annual plants. The seeds of each species, and their varieties, should be annually saved from the best plants.

All the forts grow very well and freely in any common garden soil, which is in an open exposure, exhibiting a particularly conspicuous autumnal bloom, in long succession; and when properly arranged, and disposed in assemblage with other forts of plants, afford a highly ornamental variety and effect, in the great diversity of the various forms and colourings of the flowers, in the different forts and varieties.

In saving the seed, it should be collected only from the finest and fullest double flowers, when perfectly ripe, keeping that of the different varieties quite distinct. The prime large heads of seed of each fort, after being well dried, may either have the seed beat and rubbed out, or kept in them, putting the whole up into bags, boxes, or drawers, until the period of putting them into the ground. Fresh seed should constantly be saved every year, as that of more than one year old will seldom grow well.

**TAGGAH**, in *Geography*, a town of Africa, in the country of Algiers; 24 miles S.E. of Seteef.

**TAGGIA**, a town of the Ligurian republic; 4 miles N.E. of St. Remo.

**TAGGING**. See **SHEARING**.

**TAGHAYOOG BAY**, in *Geography*, a bay on the west coast of the island of Paraguay. N. lat. 25° 2'.

**TAGHMOM**, a post-town of the county of Wexford, Ireland, on the road from New Ross to Wexford, which was a borough before the union, and sent two members to the house of commons. It is 73 miles S. by W. from Dublin, and about 9 W. from Wexford.

**TAGIA**, a small island in the bay of Gunong-Tellu, on the east coast of Celebes. S. lat. 0° 30'. E. long. 122° 6'.

**TAGIABAD**, a town of Persia, in the province of Irak; 15 miles E. of Natens

**TAGIAH**, a river of Algiers, which runs into the Mediterranean, 24 miles E. of Oran.

**TAGIDOG**, a river of North Wales, which runs into the Alen, 4 miles N. of Wrexham.

**TAGIL**, a river of Russia, which runs into the Tura, 48 miles W. of Turinsk.

**TAGILSKOI, VERCHNEI**, a town of Russia, in the province of Ekaterinburg; 52 miles N. of Ekaterinburg.

**TAGILSKOI, NIZNEI**, a town of Russia, in the province of Ekaterinburg; 60 miles N. of Ekaterinburg.

**TAGIOURA**, a town of Africa, in the country of Tripoli; 10 miles E. of Tripoli.

**TAGLARET**, a town in the department of the Po; 7 miles W. of Pinerolo.

**TAGLIACOZZI**, or **TALIACOTIUS, GASPARO**, in *Biography*, was born at Bologna in 1546, and practised with celebrity as a physician and surgeon in his native city from the year 1570 to 1599, where he died. The peculiar practice, implied in his name, was that of restoring lost parts by incision; and this practice he derived from some Neapolitan and Sicilian surgeons. It was founded on the principle, that two raw surfaces of living bodies or parts, attached to each other in close contact, will adhere and mutually transmit circulating fluids. On this subject he published two treatises: *viz.* "Epistola ad Hieronymum Mercurialem de Narihus, multo ante abscissis, reficiendis," Francof. 1587; and "De Curtorum Chirurgia per Incisionem, Lib. duo, additis Cutis traducis, Instrumentorum omnium, atque Deligationum, iconibus et tabulis," Venet. 1597, fol. A similar practice has anciently prevailed in India, and is now occasionally adopted after the common punishment of amputating the nose; for restoring which, a piece from the skin of the forehead is ingeniously engrafted. Modern surgeons have availed themselves of the principle, by bringing over flaps of the adjacent skin, in order to accelerate the healing after amputation, and other operations. Haller. Eloy. Gen. Biog.

**TAGLIACOZZO**, in *Geography*, a town of Naples, in Abruzzo Ultra; 18 miles S.W. of Aquila. N. lat. 42° 4'. E. long. 13° 19'.

**TAGLIATO**, Ital., in *Music*, is used for measure, which the French call *barré*; that is, when the character for common time is thus marked,  $\overset{\text{H}}{\text{C}}$ , or  $\overset{\text{C}}{\text{H}}$ , with a perpendicular line drawn through the middle of the C; it implies quick time, in which the notes are played or sung twice as rapidly as in the usual common time; a semibreve being performed like a minim, a minim like a crotchet, a crotchet like a quaver, &c. A *breve*, double the length of a semibreve, used to fill a bar; whence the terms *alla breve*.

This time is still used in music *à capella*, and *alla Palestrina*; in which the notes being chiefly open, and in fugue, musicians usually call a fugue consisting chiefly of semibreves and minims a *white fugue*. The time, too, when a line is drawn through the C, is called *cut time*.

**TAGLIÈR**, in *Geography*, a small island in the gulf of Venice. N. lat. 44° 10'. E. long. 15° 17'.

**TAGLIO**, a river of the Ligurian republic, which runs into the Mediterranean, 4 miles E. of St. Remo.

**TAGLIO BAY**, a bay on the south coast of the island of Mindanao. N. lat. 6° 8'. E. long. 125° 40'.

**TAGLO Point**, a cape on the north-west coast of Mindanao.

**TAGNON**, a town of France, in the department of the Ardennes; 8 miles S.W. of Rethel.

**TAGOAST, TAGAOST**, or *Tagavast*, a large town of

Africa, in the kingdom of Sus; said by some to have been the birth-place of St. Augustine; situated in a fertile country, and defended by a garrison of 400 men; 140 miles S.W. of Morocco.

**TAGODAST**, a town of Morocco, near the foot of mount Atlas; 60 miles N.E. of Morocco.

**TAGOLANDE**, an island in the East Indian sea, about 10 miles in circumference. N. lat. 2° 18'. E. long. 125° 6'.

**TAGOMAGO**, a small island in the Mediterranean, near the east coast of the island of Iviça.

**TAGORA**, in *Ancient Geography*, a town of Africa, in Numidia. Anton. Itin.

**TAGOURIE**, in *Geography*, a town of Chinese Tartary, in the province of Hami; 40 miles N.N.E. of Hamtamtam.

**TAGOU-ZAINAH**, the towns of Taggah and Zaina in Algiers, being contiguous, and separated only by a small brook; 50 miles S.W. of Constantina.

**TAGTE-RUSTAN**, a mountain of Persia, very much resorted to by the Gentoos; 4 miles from Ispahan.

**TAGTESSA**, a town of Morocco; 120 miles W.N.W. of Morocco.

**TAGUA**, a town and also district of Africa; 250 miles N.E. of Bornou. N. lat. 19° 10'. E. long. 27° 20'.

**TAGUAN**, in *Zoology*. See *SCIURUS Petauris*.

**TAGULMEMMET**, in *Geography*, a town of Algiers; 5 miles S.E. of Mustyganm.

**TAGULO**, a town on the south coast of the island of Mindanao. N. lat. 7° 30'. E. long. 124°.

**TAGUMADERT**, a town of Africa, in the country of Darah; 20 miles S. of Tattah.

**TAGURIN**, a town on the west coast of the island of Luçon. N. lat. 16° 20'. E. long. 120° 48'.

**TAGUS**, or **TAGO**, a river, which rising in the mountains of Molina, that separate the kingdom of Aragon from Old Castile, passes by Araujuez, Toledo, Talavera de la Reyna, crosses Castile and Estremadura, and enters Portugal at Montalvao; traversing Estremadura, it passes by Abrantes, Santarem, &c. and runs into the Atlantic about 10 miles below Lisbon. Its current is broken by many cataracts, so that on this account, and also on account of its rocks, it is not navigable far above Lisbon.

**TAGYPEEL**, a small island in the East Indian sea, near the N.E. coast of Bornou. N. lat. 6° 29'. E. long. 117° 54'.

**TAGZA**, a town of Algiers; 12 miles S.S.E. of Constantina.

**TAHA el Modain**, a town of Egypt; 5 miles S.W. of Samalat.

**TAHABUCKOO**, a town of Thibet; 5 miles N.W. of Jhanfu-Jeung.

**TAHAIS**, a town of Sweden, in the province of Savolax; 50 miles N.N.W. of Nyfot.

**TAHAL**, a town of Spain, in the province of Grenada; 8 miles N.N.E. of Purehena.

**TAHATE**, a town of Arabia, in Yemen; 12 miles W. of Z'bid.

**TA-HEAN**, a city of China, of the second rank, in Yun-nan; 1130 miles S.W. of Peking. N. lat. 25° 52'. E. long. 101° 50'.

**TAHEJ**, a town of Hindoostan, in Cutch; 150 miles W. of Amedabad. N. lat. 23° 16'. E. long. 69° 58'.

**TA-HE-KAN**, a small island near the coast of China. N. lat. 37° 57'. E. long. 120° 30'.

**TAGHUM**, a town of Bengal; 14 miles W. of Koonda.

**TAHIAO**,

**TAHIAO**, a town of Corea ; 35 miles S.S.E. of Long Kouang.

**TAHIRAN**, a town of Persia, in the province of Irak ; 45 miles E.S.E. of Casbin. N. lat.  $35^{\circ} 50'$ . E. long.  $51^{\circ}$ .

**TAHNUM**, a town of Gorkah ; 20 miles N.W. of Gorkah.

**TA-HOOROWA**, one of the smaller Sandwich islands, situated about nine miles from the S.W. part of Mowee ; destitute of wood, with a sandy, barren soil. N. lat.  $21^{\circ} 40'$ . E. long.  $199^{\circ} 30'$ .

**TAHOU**, a town of Africa, on the Grain Coast. N. lat.  $4^{\circ} 50'$ . W. long.  $6^{\circ} 50'$ .

**TAHRIE'**, a town of Persia, in Farfistan, on the coast of the Persian gulf ; 12 miles E.S.E. of Konkum. N. lat.  $27^{\circ} 45'$ . E. long.  $52^{\circ} 20'$ .

**TAHTA**, a town of Egypt, on the Nile ; 32 miles S. of Siut. N. lat.  $26^{\circ} 57'$ . E. long.  $31^{\circ} 22'$ .

**TAHUK**, or **TABUK**, a town of Arabia, in the province of Nedsjas ; 176 miles S.S.E. of Jerufakem.

**TAI**, a city of China, of the second rank, in Chan-si ; 175 miles W.S.W. of Peking. N. lat.  $39^{\circ} 6'$ . E. long.  $112^{\circ} 30'$ .—Also, a city of China, of the second rank, in Kiang-nan ; 22 miles E. of Yang-tcheou. N. lat.  $32^{\circ} 30'$ . E. long.  $119^{\circ} 36'$ .—Also, a large lake. See **TAI-HOO**.

**TAI-Arabs**, an ancient and noble tribe, the mention of which often occurs in the Roman history. They still continue in possession of the same tract of country which they had in the time of Julian, *viz.* between Moful, Nisibin, and the Khadour.

**TAJACU**, or the *Sus tajacu* of Linnæus, in *Zoology*, the name of an animal common in some parts of America, called by many authors *aper moschiferus*, or the musk-boar. (See **SUS**.) It is of the shape of our hog, but much smaller, and has no tail, and its head is broader, and the snout much less pointed than in our hog ; it has two tusks in each jaw, those in the upper jaw pointing down, and hardly apparent when the mouth is shut, the others hid ; the neck is short and thick, and the whole body of a grisly colour, or mixture of black and grey ; its body is covered with hairs, much thicker and stronger than our hog's-bristles, something like the bristles of the hedge-hog, and like them also variegated with circles of black and white ; these are four or five inches long on the back, and gradually diminish to the sides ; on the middle of its head, between the ears, it has a sort of crest, made up of black bristles ; the belly almost naked ; from the shoulders to the breast is a band of white ; its ears are small and erect, and its eyes small ; its snout, feet, and hoofs, are just like those of the European hog ; but the two posterior or exterior hoofs are longer than in any other of the cloven-footed beasts.

What is most singular, however, in this creature, is a certain gland which he has upon the back, and which has given occasion to some to say its navel was placed there. This gland is situated on the very ridge of the back near the rump, and is so closely covered with long bristles, that till they are removed by blowing, and keeping them back with the hand, the gland is not to be seen : when these are removed, there is seen a spot almost naked, in the middle of which the top of the gland is seen ; the lips of this gland usually stand a little way above the flesh, and its aperture easily admits a large stylus ; and this gland, when lightly pressed, spews out a liquid substance of a brownish-yellow colour, and scent something like that of musk or civet. The gland itself is placed between the skin and flesh, and is not wholly covered by its constricting muscle, but only surrounded by it at its bottom.

This animal inhabits the hottest parts of South America, and some of the Antilles ; lives in forests, on the mountains, is very fierce, and if wounded, will turn on the hunter. It feeds on fruits and roots, toads and serpents, which it skins with great dexterity. It is reckoned very good food ; but unless the dorsal gland be cut out as soon as it is killed, the flesh will be infected by it. The Indians call this animal *pequaris*, whence its name *pecary*. Ray and Pennant.

**TAJAMENTO**, or **TAGLIAMENTO**, in *Geography*, a river which rises in Friuli, and runs into the gulf of Venice ; 10 miles S.S.E. of Concordia.

**TAJANJE**, a river of Brazil, which runs into the Atlantic, S. lat.  $27^{\circ} 35'$ .

**TAJARA**, in *Ichthyology*. See **RAIA**.

**TAIBEH**, in *Geography*, a fortified town in the desert of Syria, having near its gate a fountain of fresh water ; 85 miles E. S. E. of Aleppo. N. lat.  $35^{\circ} 10'$ . E. long.  $38^{\circ} 45'$ .

**TAI-CHAN**, a town of Corea ; 20 miles W. of Haimen.

**TAIDENT**, a town of Africa, in Fezzan ; 130 miles S.S.W. of Mourzouk.

**TAJE-ELT**, a town of Algiers ; 35 miles S.S.E. of Bona.

**TAIEZA**, a town of Croatia ; 45 miles E. of Bilhacs.

**TAIGAREE**. See **TEGERLY**.

**TAI-HOO**, or **TAI**, a beautiful lake of China, said to be near fifty leagues in circumference, dividing the provinces of Kiang-nan and Tche-kiang, and surrounded by a chain of picturesque hills. It supplies Sou-choo-foo, at a small distance from it, with fish, and serves the inhabitants also as a place of public resort and recreation. Many of the pleasure-boats on this lake are rowed by a single female ; and the rowers are said to follow more than one profession.

**TAIBI**, in *Zoology*, the name of an American animal, described by Marcgrave and other authors, and supposed by some to be only the male of the opossum. The Portuguese in America call it the *cachorro de mato*, and by the Dutch it is called *boschratte*. See **DIDELPHIS**.

**TAJEOURA**, in *Geography*, a town of Africa, in the kingdom of Adel ; 15 miles N.W. of Zeilah.

**TAIL, CAUDA**, that part of an animal which terminates its body behind.

The tail is different, both in figure and use, in the various species. In land-animals it serves to rid them of flies, and is usually covered with hair, and strengthened with bones : in fishes it is cartilaginous, and serves them as a helm to steer their course withal in swimming.

In birds it is covered with feathers, and greatly assists in all ascents and descents in the air ; as also to render their flight steady, by keeping the body upright in that subtle and yielding medium, by its ready turning and answering to every vacillation of the body.

**TAIL of Fish**. This part in the fish-kind is the subject of very great distinctions, among the characters of the several genera. It differs in the several kinds of fish in a very obvious manner, in number, situation, and figure. In regard to the first difference, the *acus lumbriciformis*, and one of the kinds of the *serpens marinus*, have no tail at all ; in all other fish there is a tail, and it is never more than one on each fish.

In regard to situation, there is this great difference, that in some it is placed perpendicularly, in others horizontally. In almost all the known fishes it is placed perpendicularly, except in the dolphin, the phocæna, the orca, the manati, and all the whale-kinds ; for in all these it is placed horizontally, when the body is laid in its natural posture.

In figure it has many very remarkable differences, which are of great use in ichthyological distinctions. 1. In some fish it is rounded at the end; as in the cottus, and some others. 2. In some it is cut off even as it were at the end, so that the whole tail is a sort of parallelogram; as in the tench, and some of the salmon. 3. In some fishes it is cuspidated at the end, as is the case in the conger, the eel, and the petromyzon. 4. In others it has as it were a small segment of a circle cut out at the end, and so is slightly hollowed out; this is the case in the carassius, and some of the salmon. 5. In many fish it is forked or opened into two points, making an acute angle: this is the figure of the tail in the perches, the cyprini of many kinds, &c. 6. Finally, the tail is falcated in many fish, that is, it is of the shape of a crescent; as in the sword-fish, the tunny, mackarel, and the like. Artedi, Ichthyolog.

TAIL, in *Anatomy*, is used for that tendon of a muscle which is fixed to the moveable part. In opposition to which, the tendon fixed to the immovable part is called the *head*.

TAIL, *Dove*, or *Swallow's-Tail*, among *Carpenters*. See DOVE-TAIL.

TAIL, *Peacock's*, a term applied to all circular compartments which go enlarging from the centre to the circumference; imitating, in some measure, the feathers of a peacock's tail, when spread.

TAIL, *Dragon's*, *cauda draconis*, in *Astronomy*. See DRAGON, and NODE.

The astrologers take care to put this in all their horoscopes.

TAIL, *Horse's*, among the Tartars and Chinese, is the ensign or flag under which they make war.

Among the Turks, it is the standard borne before the grand visier, the bashaws, and sangiaes; in order to which, it is fitted on the end of a half-pike, with a gold button, and is called *toug*.

There are bashaws of *one*, others of *two*, others of *three* horses' tails. The horse's tail placed on the general's tent, is a signal of battle. For the original of this custom, it is related, that in a certain battle, the standard being taken by the enemy, the general of the army, or, as others say, a private horseman, cut off the tail of his horse, and fastening it to the end of a half-pike, encouraged the troops, and gained the victory. In memory of which noble action, the grand signior appointed that standard to be borne, for the future, as a symbol of honour. Ricaut.

TAIL, in *Heraldry*, &c. is particularly used for the tail of a hart; those of several other creatures having peculiar and distinct names.

As, that of a buck, roe, or any other kind of deer, is called the *single*; that of a boar, the *wreath*; of a fox, the *brush*; of a wolf, the *stern*; and of a hare and rabbit, the *scut*.

TAIL of a Comet. See COMET.

TAIL, or *Toile*, in *Common Law*, signifies a limited fee, as opposite to fee-simple.

It is thus called from the barbarous word *taliare*, whence the French *tailler*, *to cut*; because such fee is so minced or parted, as it were, that it is not in the owner's free power to dispose of it; but is, by the first giver, *cut*, *taillé*, and divided from all others, and tied to the issue of the donee.

The limitation of tail is either *general* or *special*. See FEE-TAIL.

TAIL after *possibility of issue extinct*, is where land being given to a man and his wife, and the heirs of their two bodies, and the one outlives the other, without issue between them begotten: the survivor upon this shall hold the land

for term of his own life in quality of tenant in tail after the possibility of the issue extinct.

This estate must be created by the act of God, *i. e.* by the death of that person out of whose body the issue was to spring, for no limitation, conveyance, or other human act, can make it. It partakes partly of the nature of an estate-tail, and partly of an estate for life. The tenant is, really, only tenant for life, but with many of the privileges of a tenant in tail; as, not to be punishable for waste, &c.; or he is tenant in tail, with many of the restrictions of a tenant for life; as, to forfeit his estate if he aliens it in fee-simple; whereas such alienation by tenant in tail, though voidable by the issue, is no forfeiture of the estate to the reversioner; who is not concerned in interest, till all possibility of issue be extinct. But, in general, the law looks upon this estate as equivalent to an estate for life only; and, as such, will permit this tenant to exchange his estate with a tenant for life: which exchange can only be made of estates that are equal in their nature. Blackst. book ii. &c.

TAIL, *Fee*. See FEE-TAIL.

TAIL, *Several*. See INHERITANCE.

TAIL, or *Taile*, is also used for what we vulgarly call *tally*, *taille de bois*.

TAIL, in the *Manege*. Many affirm that the dock of a horse's tail serves to point out his sixth or seventh year; saying, that about the time that the black speck or eye of the bean begins to disappear, and the cavity to be filled, the dock of the tail becomes longer, because the vigour of the young years begins to abate; and nature has not strength enough to nourish and keep up the joints or knots that form the dock; so that when the horse is six years old, one of these joints slackens and begins to fall down; and a year after, another descends in like manner. But this relaxation or downfalling happens sooner in some than in others, according as they have been well or ill kept, with reference to feeding, housing, and working. Accordingly we find the marks of a horse's age, taken from his tail, are so erroneous, that many jockies maintain, that the first joint descends when he is nine, and the second when he is ten years old.

TAIL, *Docking of*. See DOCK.

In the practice of docking and shortening this part of sheep, with the intention of keeping them more clean and free from dirt and disease, it is usually done so as to leave a few joints of the tail remaining, as the length of four or five inches, or more. It is common to cut off the tails of all the lambs at the time of castrating the male ones, in some places; but in others they perform it at different other suitable times. It should, however, always be done while the animals are young. The bleeding which succeeds this operation is supposed by some to be also very beneficial to the sheep.

TAIL-LOCKS, the locks of wool which are cut off from about the tails and the insides of the legs and thighs of sheep, in order to prevent dirt and nastiness attaching to and fixing upon them. They form a sort of wool, which is useful for inferior purposes. See WOOL.

It is always a good practice to keep sheep as clear as possible from these locks.

TAIL-ROT, a disease affecting cows that are ill fed during the winter. See YELLOW, *Joint*.

TAIL-SOAKED, a disease incident to cows, by which the joint of the tail near the rump is affected.

TAIL of the Trenches, in the *Military Art*. See TRENCH.

TAIL, in *Sea Language*, is a name given by sailors to the extremities of a hurricane, in which the violence is considerably exhausted.

TAIL-Block, in a *Ship*, a small single block, having a short

short piece of rope attached to it, by which it may be fastened to any object at pleasure, either for convenience, or to increase the force applied to the said object. Falconer.

**TAIL of a Lock**, in *Inland Navigation*, the lower end, or entrance into the lower pond.

**TAIL of a Seed**, in *Botany* and *Vegetable Physiology*, is a generally downy or feathery appendage to some seeds, formed of the permanent elongated style. Examples are found in *Glematis*, *Anemone*, *Dryas*, and *Geum*. The use of such an appendage is either to serve as a wing, for the purpose of conveying the seed through the air; or to attach it to the coats of animals, by which the same end is answered, of transporting it to a distance from its original station.

**TAIL-Piece** of a violin, tenor, or base, is generally a piece of ebony attached to the end of the instrument, to which the strings are fastened below the bridge.

**Tail-piece**, or addition to a musical composition, in Italian is termed *coda*; which see.

**TAILE**, in *Geography*, a river of Hindoostan, which runs into the Mahanada at Sonepour.

**TAILINGS**, in *Agriculture*, a term applied to the lighter parts of grain, which in clearing fall to the hinder parts of the heap, especially where the wind is had recourse to in the operation.

**TAILLE'**, or **TAILLEE**, in *Heraldry*. See **TRANCHÉ**.

**TAILE**, Fr., in *Music*, implies the tenor part, vocal and instrumental. In vocal music it unites the base with the counter-tenor; in instrumental compositions it unites the base with the second violin. See **TENOR** and **COMPASS of Voices**, **VIOLA**, and **ALTO Viola**.

**TAILLEBOURG**, in *Geography*, a town of France, in the department of the Lower Charente; 6 miles N. of Saintes.

**TAILLOIR**, in *Architecture*, a term which some of our writers, after the French, use for abacus.

**TAILOOR**, in *Geography*, a town of Hindoostan, in Mysore; 10 miles N.N.W. of Vencatighery.

**TAIM**, a town of Brasil, on the E. coast of lake Merim. S. lat. 32° 32'.

**TAIMA**. See **TINO**.

**TAIMEN**, in *Ichthyology*. See **SALMO**.

**TAIMURSKAIA**, in *Geography*, a gulf or bay of Russia, in the Frozen ocean, between Cape Sievero Vostochnoi and Cape Sievero Zapadnoi. N. lat. 75° to 77°. E. long. 94° 10' to 98° 10'.

**TAIN**, a town of France, in the department of the Drome; 9 miles W.N.W. of Romans.

**TAIN**, or *Thane*, said to be derived from the Scandinavian *ting*, or court-day, a royal borough, and the county-town of Roxshire, Scotland, is situated on the southern shore of the Frith of Dornoch; 201 miles N. by W. from Edinburgh. The town is old and irregularly built; but a number of new houses have lately been erected. Several acres have also been recently built on, forming a suburb, which is separated from the town by a small river, over which is a bridge. The parish church, which was built in 1471, was formerly collegiate. Tain is a chartered royal borough, and unites with Dingwall, Dornoch, Kirkwall, and Wick, in sending a representative to parliament. A well-supplied market is held weekly, and six fairs annually.

The parish of Tain extends about eight miles in length, and two in breadth. Its surface is in general flat, except towards the west, where it rises into small hills. The only manufactures carried on are the spinning of flax, and the tanning of leather. Here is a parochial school, which is ably conducted, and is in a flourishing condition: besides which, there is a society's school in the eastern district.

The population of the borough and parish, according to the return to parliament in the year 1811, was estimated at 2384; the number of houses 526.—Carlisle's Topographical Dictionary of Scotland, vol. ii. Beauties of Scotland, vol. v.

**TAINACH**, a river of Wurtemberg, which runs into the Nagold, 2 miles S. of Calw.

**TAI-NGHAN**, a city of China, of the second rank, in Chan-tong; 255 miles S.S.E. of Peking. N. lat. 36° 15'. E. long. 116° 50'.

**TAINHA**, in *Ichthyology*, a name given by some to a species of mullet caught in the American seas, and more usually called the *curema*.

**TAINT**, in *Law*, signifies either, substantively, a conviction, or, adjectively, a person convicted of felony, treason, &c. See **ATTAINT**.

**TAINY**, in *Geography*, a town of Hindoostan, in Dindigul; 4 miles N. of Outampaleam.

**TAJO**. See **TAGUS**.

**TAI-OUAN**, a city and sea-port, situated on the west coast of the island of Formosa, and the capital of the island. The streets, which are drawn nearly in a line, almost a league long, and from 30 to 40 feet broad, abound with shops of silk, china-ware, and other commodities, in which the Chinese excel. The houses are mostly covered with clay and bamboo. The town is neither walled nor fortified. The harbour is sheltered from every wind, but its entrance is difficult, on account of the increasing accumulation of sand. N. lat. 23°. E. long. 113°.

**TAIPARA**, or **TUIPARA**, in *Ornithology*, the name of a Brazilian species of parouquet. It is of the size of a lark, and of a pale green colour over its whole body; its tail is short, not reaching beyond the tips of the wings when closed; its beak is red, and its legs are grey; near the origin of the beak it has a semi-lunar red spot on the head, and a yellow spot on the middle of each wing. It builds in the deserted abodes of ants on trees. Marcgrave's Hist. Bras. See **PSITTACUS**.

**TAI-PING**, in *Geography*, a city of China, of the first rank, in Kiang-nan, on the Yang-tse river; 525 miles S. of Peking. N. lat. 31° 38'. E. long. 118° 14'.—Also, a city of China, of the first rank, in Quang-li; it is built on a point of land, almost surrounded by a river; fortified on the land side by a wall. Its territory is very fruitful, well cultivated, and populous. It has a number of forts, on account of its vicinity to the kingdom of Tonquin; 1175 miles S.S.W. of Peking. N. lat. 22° 25'. E. long. 106° 34'.

**TAI-SANG**, a town of Corea; 17 miles S.S.E. of Hoang-tcheou.

**TAISERO**, a town of Japan, in the island of Ximo; 75 miles N. of Nangafaki. N. lat. 33° 30'. E. long. 132° 7'.

**TAISUGAN KARAKOL**, a lake of Russia, in the government of Upha; 132 miles S.S.W. of Orenburg. N. lat. 54° 32'. E. long. 53° 44'.

**TAI-TCHEOU**, a city of China, of the first rank, in Tche-kiang. This city, which has six others in its district, is situated on the bank of a river, in a very mountainous country. The neighbourhood of the sea supplies it with all things necessary. The most remarkable thing is, that they can catch a kind of thornback, whose skin is proper for several uses, especially to make scabbards for cutlasses, of which they carry on a great trade in the country, and transport them into Japan, and throughout the empire; 722 miles S.S.E. of Peking. N. lat. 28° 55'. E. long. 121° 2'.

**TAITI**. See **OTAHIEITE**.

**TAI-TING**, a city of China, of the second rank, in Koci-

Koel-tcheou; 967 miles S.S.W. of Peking. N. lat.  $27^{\circ} 5'$ . E. long.  $105^{\circ} 14'$ .

**TAI-TONG**, a city of China, of the first rank, in Chan-si. It is situated in a mountainous country, and is the only place exposed to the incursions of the Tartars: it is very well fortified, according to the manner of the Chinese, and has a very strong garrison; its territory is surrounded by the great wall, which has forts from place to place; its jurisdiction is very large, and extended over four great cities of the second order, and seven of the third: its mountains abound with all kinds of simple and medicinal herbs, which the botanists gather with great care. Lapis lazuli is in great plenty here; and there is a kind of jasper, which is transparent, and as white as agate; porphyry, marble, and jasper of all colours are very plentiful; and here is also a great trade for skins; 155 miles W. of Peking. N. lat.  $40^{\circ} 5'$ . E. long.  $112^{\circ} 44'$ .

**TAITOU SAHA**, a small island in the sea of Japan. N. lat.  $42^{\circ} 32'$ . E. long.  $130^{\circ} 42'$ .

**TAI-TSANG**, a city of China, of the second rank, in Kiang-nan; 567 miles S.S.E. of Peking. N. lat.  $31^{\circ} 30'$ . E. long.  $120^{\circ} 24'$ .

**TAIVERAM**, a town of Hindoostan, in the province of Dindigul; 8 miles N.W. of Outampaleam.

**TAJUNA**, a river of Spain, which rises in the north part of New Castile, and runs into the Xarama, a little before its union with the Tagus.

**TAIWAN**. See **FORMOSA**.

**TAI-Y**, a city of China, of the second rank, in Quang-si, on the south side of the Pofoi; 1125 miles S.S.W. of Peking. N. lat.  $23^{\circ} 24'$ . E. long.  $106^{\circ} 18'$ .

**TAI-YUEN**, a city of China, of the first rank, in Chan-si; 230 miles W.S.W. of Peking. N. lat.  $37^{\circ} 54'$ . E. long.  $111^{\circ} 56'$ .

**TAIZALUM**, in *Ancient Geography*, a promontory of the isle of Albion, between the mouth of the Celnus and that of the Diva. (Ptol.) This is supposed to be Kynaird-Head, near Fraserburgh, in Buchan; the Celnus being the river Spay, in the shire of Elgin, and the Diva the river Dee at Aberdeen.

**TAK, EL**, in *Geography*, a town of Persia, in the province of Segestan; 15 miles N. of Zareng.

**TAKA**, a town of Nubia, capital of a district, called Takaki, on the Belese; 50 miles S.E. of Ilak.

**TAKAGUS**, a town of Japan, in the island of Nippon; 60 miles N.W. of Meaco.

**TAKAKAKKAN**, a small island in the Eastern Indian sea, near the east coast of Borneo. N. lat.  $3^{\circ} 8'$ . E. long.  $116^{\circ} 51'$ .

**TAKALUOTO**, a small island on the E. side of the gulf of Bothnia. N. lat.  $61^{\circ} 39'$ . E. long.  $21^{\circ} 10'$ .

**TAKAMIDJA**, a town of Japan, in the island of Nippon; 150 miles S.W. of Meaco.

**TAKAUL**, a town of Asiatic Turkey, in Caramania; 40 miles N. of Cogni.

**TAKE and Leave**, in *Sea Language*. The sailors say, a ship can take and leave upon her when she will; when she sails so well, that she can come up with another, or outfail her at pleasure.

**TAKE, Thistle**. See **THISTLE**.

**TAKE-In, To**, in *Ship-Building*, is to come-up a sett and make it fall again closer to the plank, as it works nearer to the timbers.

**TAKE-In Sail, To**, is to diminish its surface by reefing, &c. particularly when the wind increases too much. See **TAKING-IN**.

**TAKENO**, in *Geography*, a town of Japan, in the island of Ximo; 40 miles E.S.E. of Ikva.

**TAKERS—Carr-Takers**. See **CARR-TAKERS**.

**TA-KIA-TCHE**, in *Geography*, a town of China, on the W. coast of the island of Formosa. N. lat.  $24^{\circ} 22'$ . E. long.  $119^{\circ}$ .

**TAKING-IN**, in *Sea Language*, denotes the act of brailing-up and furling the sails at sea, particularly when the wind increases. It is generally used in opposition to *setting*.

**TA-KIRON-HOTUN**, in *Geography*, a town of the kingdom of Corea; 425 miles E. of Peking.

**TAKLACOT**, a town of Thibet; 60 miles N.E. of Kerion.

**TAKMITZSKAIA**, a town of Russia, in the government of Tobolsk, on the Irtych; 36 miles S. of Tara.

**TAKPO**, a large province of Thibet, which is subdivided into seven takpos. On the N. it has the province of U, on the S. Combo, on the E. Cobang, and on the W. Tzhang.

**TAKTANG**, a river of Russia, which runs into the Lis, N. lat.  $62^{\circ} 24'$ . E. long.  $89^{\circ} 44'$ .

**TAKY**, a town of Bengal; 30 miles E. of Calcutta.

**TAL**, a name used by some writers on the materia medica to express the dung of peacocks; and by some of the chemical writers for any alkali salt.

**TALA**, in *Botany*, a name by which some authors call the plant, whose seed is the sesamum, or oily purging grain of the shops.

**TALABON**, in *Geography*, a town on the W. coast of the island of Gilolo. N. lat.  $1^{\circ} 40'$ . E. long.  $127^{\circ} 20'$ .

**TALABONG**, in *Ornithology*, a name given by the inhabitants of the Philippine islands to a species of heron, common among them; which is much smaller than our heron, and perfectly white all over.

**TALABRIGA**, in *Ancient Geography*, a town of Spain, in Lusitania, towards the south, upon the Vatna, not far from the sea, S.W. of Langobriga.

**TALABROCA**, the name of one of the most celebrated towns of Hyrcania. Strabo.

**TALACACHA**, in *Geography*, a town of South America, in the province of Tucuman; 15 miles S. of St. Miguel de Tucuman.

**TALACOUAN**, a town of Lower Siam, on an island in the Mecon; 30 miles S. of Juthia.

**TALÆDITES**, *ταλαειδης*, in *Antiquity*, gymnical exercises in honour of Jupiter *Ταλαιος*.

**TALAFa**, in *Geography*, a small island in the South Pacific ocean, among those called Hapaae, S.W. of Ho-laiva.

**TALAGIR**, a small island among the Philippines; 25 miles W. of Samar.

**TALAGOS**, a town of Africa, in the country of Sierra Leone. N. lat.  $10^{\circ} 20'$ . W. long.  $13^{\circ} 40'$ .

**TALAGUADA**, a town of South America, in the province of Carthagea; 10 miles N.N.W. of Mompox.

**TALAHSECHTE**, an Indian town of East Florida, on the river St. Juan, near the bay of Apalache, in the gulf of Mexico; 52 miles N. of St. Mark. This town contains about 30 habitations, constructed of frame-work; and covered with the bark of the cypress-tree. The inhabitants form large handsome canoes of the trunks of cypress-trees, capable of holding 20 or 30 warriors. In these they descend the river on trading or hunting expeditions on the sea-coast, islands, and keys as far as the point of Florida; and sometimes they cross the gulf and sail to the Bahama islands, and even to Cuba, returning with cargoes of spirituous liquors, coffee, sugar, and tobacco.

**TALAI-**

TALAI-HAI, a town of Chinese Tartary. N. lat.  $44^{\circ} 17'$ . E. long.  $120^{\circ} 45'$ .

TALAI-HOTOC, a town of Thibet; 105 miles S.W. of Haratoubé.

TALALALUM, or THALATATUM, in *Ancient Geography*, a town of Africa Propria, on the route from Tacapæ to the Greater Leptis.

TALAMANCA, in *Geography*, a town of Spain, in New Castile; 14 miles N.W. of Guadalaxara.

TALAMATA, a town of Hindoostan, in Coimbatore; 15 miles N. of Damicotta.

TALAN, a small island in the sea of Ochotsk. N. lat.  $59^{\circ} 30'$ . E. long.  $149^{\circ} 14'$ .

TALANGBOANG, a town on the W. coast of Sumatra. S. lat.  $4^{\circ} 21'$ . E. long.  $105^{\circ} 44'$ .

TALANT, a town of France, in the department of the Côte d'Or; 2 miles N.W. of Dijon.

TALANTA, a town of European Turkey, in the island of Negroponte; 34 miles N.W. of Negroponte.—Also, a town of European Turkey, in Livadia; 18 miles N.E. of Livadia.

TALA-OSO, a town of Chinese Tartary, in the country of Hami; 28 miles E.S.E. of Hatamtam.

TALAPOINS, a name given in Siam to those who dedicate themselves to religion. See SIAM.

TALAPOOSEE, in *Geography*, the great N.E. branch of the Alabama or Mobile river, in Florida. It rises in the high lands near the Cherokees, and runs through the high country of the Oakfuskee tribes, in a westerly direction, being full of rocks, falls, and shoals, till it reaches the Tackabatches, where it becomes deep and quiet; from thence the course is W. about 30 miles to Little Talafsee, where it is united with the Coofa or Coofa Hatcha. The lower part of this river is, in most maps, called Oakfuskee.

TALAPORUM, a town of Hindoostan, in Calicut; 20 miles N.N.W. of Tellicherry.

TALARHO-KARA-PALHASSUM, a town of Chinese Tartary, in the country of the Eluths; 715 miles N.W. of Peking. N. lat.  $47^{\circ} 34'$ . E. long.  $102^{\circ} 34'$ .

TALARIUS LUDUS, among the Romans, a game somewhat resembling our dice-playing, and performed with a kind of gold or ivory dice, which they shook as we do in a box, before they threw them. There was this difference, however, between their game and ours, that our dice have six sides, because they are cubical; but theirs had but four, and were conically shaped. They made use of them for divination, as well as playing; and they concluded upon a good or evil augury, according to what came up. As they usually threw four of them at a time, the best chance was when four different sides came up. The sides were called by the name of some animal, as the dog, vulture, basilisk, &c.: or of some deity, as Venus, Hercules, &c. Some authors have been of opinion, that they were marked with the forms of animals, or images of gods, and not with numbers or dots, as our dice are.

TALARN, in *Geography*, a town of Spain, in Catalonia; 22 miles N. of Balaguer.

TALASSEE, or TALLASSEE, a county consisting of a tract of land bounded by East Florida on the S., N. by Alatomaha river, E. by Glynn and Camden counties, and W. by a line extending from the W. part of Ekanfanoka swamp, in a N.E. direction till it strikes the Alatomaha river, at the mouth of the Oakmulgee.—Also, a town of the Upper Creeks, in the Mississippi territory, on the S. side of Talapoosee river; called also Big Talafsee.

TALASSIO, among the Romans, an acclamation used at marriages.

TALATUM, in *Ancient Geography*, the name of a temple of the sun, erected in Laconia, on the summit of mount Taygetus.

TALAVAN, in *Geography*, a town of Spain, in Estremadura; 25 miles S. of Palencia.

TALAVERA *la Real*, a town of Spain, in Estremadura; 13 miles S.E. of Badajos.

TALAVERA *la Reyna*, a town of Spain, in New Castile, on the Tagus, situated in a valley, and fortified; famous for its earthen-ware; 35 miles W. of Toledo.

TALAVERA *la Vieja*, a town of Spain, in New Castile; 6 miles W.S.W. of Toledo.

TALAVERUELA, or *Talavera de Badajos*, a town of Spain, in Estremadura, on the Guadiana; 9 miles E. of Badajos.

TALAUMA, in *Botany*, a word probably of South American origin, applied in the herbarium of Surian, now possessed by Jussieu, to the plant on which Plumier originally founded his genus MAGNOLIA. See under that article, sp. 2, our reasons for not receiving *Talauma*, for the present at least, as a distinct genus.

TALBERT'S ISLAND, in *Geography*, a small island in the Atlantic, on the coast of Georgia, the N. point of which is in N. lat. about  $30^{\circ} 44'$ , where St. Mary's river discharges itself into the ocean, between this island and Amelia island on the N. N. lat.  $30^{\circ} 36'$ . W. long.  $81^{\circ} 42'$ .

TALBOT, an island on the coast of East Florida, eight miles long and two wide.—Also, a county of Maryland, on the E. coast of Cheapeake bay, bounded E. by Choptank river, which divides it from Carolina county, and S. by the same river, which separates it from Dorchester. The soil of this county is rich and fertile; and it contains 14,230 inhabitants.

TALBOT, in *Zoology*, a sort of dog, noted for its quick scent, finding out the tracks, lodgings, and forms of beasts, and pursuing them with open mouth and continual cry, with such eagerness, that if not taken off by the huntsman, he is often spoiled.

TALC, in *Mineralogy*, *Idem*, Hany. The name talc, in the present systematic arrangement of Werner, is placed both as the head of a genus and a family. Brongniart restricts the name to those minerals which possess the following characters: they are soft and unctuous to the touch, and leave upon the nail, or on the surface of cloth on which they are rubbed, a white mark, which has sometimes a nacreous lustre. The texture of talc is lamellar, or fibrous: the laminae are flexible but not elastic. Talc has always a shining lustre, and is sometimes splendid and nacreous; it is translucent and often transparent; it yields easily to the nail. The laminae of which it is composed, open a little by the action of fire or of the blowpipe; the fragment swells, and the extremities of the laminae are with difficulty fusible into a white enamel. These characters, which are easily recognised, serve to distinguish talc from chlorite and nacrite, which are very fusible; and from steatite, serpentine, or the unctuous clays, which are compact, have an earthy or scaly fracture, and but little unctuousity. Talc has another remarkable property; it acquires positive electricity when rubbed with resin. Talc is susceptible of crystallization, and forms hexagonal laminae. The primitive form of the crystal is a right rhomboidal prism, in which the angles at the base are  $120^{\circ}$  and  $60^{\circ}$ . Its specific gravity varies from 2.58 to 2.87. The prevailing colours are white, apple-green, and yellow.

## TALC.

Talc is divided by some mineralogists into three sub-species, *viz.* common talc, indurated talc, and columnar talc.

*Common talc; talc laminaire*, Haüy. Its colours are those before enumerated, but the green sometimes passes into dark blue. The laminae are very tender and flexible, but not elastic: by this they may be distinguished from the laminae of mica, which possess a considerable degree of elasticity. In France this talc is called *craie de Briançon*; it is found in considerable masses in rocks of serpentine, accompanied with actinolite, granular lime-stone, and dolomite, along with indurated talc. The constituent parts are as follow:

	Vauquelin.	Klaproth.
Silex - - - -	62	61.75
Magnesia - - -	27	30.50
Alumine - - -	1.50	
Potash - - - -		2.75
Oxyd of iron - -	3.50	2.50
Water - - - -	6	2.25

It is found in Aberdeenshire and Bamfshire, in Scotland, and in various parts of the continent of Europe, where rocks of serpentine and porphyry occur. The talc which is brought from the mountains of the Tyrol is called in commerce *Venetian talc*.

Talc enters largely into the composition of the cosmetic named *rouge*. This substance is prepared by rubbing together in a warm mortar, generally of serpentine, certain proportions of carmine and finely powdered talc, with a small portion of oil of benzoin. The Romans prepared a beautiful blue or purple colour, by combining this substance with the colouring fluid of the buccinum reticulatum and buccinum lapillus, testaceous animals abounding on the coasts of the Mediterranean. The flesh-coloured polish on figures made of gypsum is given by rubbing them with talc. The Persians, according to Tavernier, whiten the walls of their houses by means of lime-water, and then powder them with silver-coloured talc. Talc has sometimes been used medicinally by the Chinese and Europeans.

The chief use of the Russian is as a screen or cover for paintings in miniature and crayons; to which purpose thin slices of it are used. The Venetian is sometimes also used for a focus; in order to which, by reason of the difficulty of pulverizing it, &c. they content themselves to rasp it with the skin of a sea-dog, and to pass the raspings through a sieve.

Pliny, in his Natural History, lib. xxxvi. c. 22. observes, that the Romans not only used the Russian sort for window-lights, but they also paved the circus with a kind of it. See GLASS.

*Indurated talc* is less flexible and less translucent than the preceding: it occurs in masses, and has sometimes a radiated structure; its colours are various shades of green and greenish-grey. It forms beds of considerable size in mountains of gneiss, mica-slate, and serpentine; it approaches nearly to pot-stone, and even to steatite, in many of its characters. It occurs in Perthshire and Bamfshire, in Scotland, and in France, Sweden, Saxony, Siberia, the Tyrol, and Switzerland. It is employed for drawing lines by carpenters, taylors, hat-makers, and glaziers. It is sometimes made into culinary vessels, like pot-stone, and is employed in powder for removing stains of grease from silk.

*Columnar talc* occurs in thin columnar prismatic concretions, and it is opaque. The connection between talc, asbestos, pot-stone, serpentine, chlorite, and even mica, may

be traced by their apparent graduation into each other, particularly in some of the rock formations. See ASBESTUS, POT-STONE, &c.

The mixture of talc with different kinds and quantities of glass may be successfully performed with a violent fire, but not with a smaller degree: thus three parts of talc, with one part of crystalline glass, make only a spongy and friable mass in a common fire; but in a more violent one, they become a firm and solid mass of a brown colour. Minium, or glass of lead, mixed in equal quantities with talc, and set in a violent fire, runs into a yellowish glass, resembling the opaque pieces of amber; and two parts of minium to one of talc, produce a clear and transparent yellow glass, which is of a hardness capable of giving fire with steel. The alkaline earths, mixed with talc, produce a mass scarcely vitrifiable by any fire: hence appears the reason why copels made of lime and talc are so very hard to vitrify. Minium, added to these mixtures, make them combine into a firm mass, but without perfect fusion; but borax added to them, melts them readily into a true glass. The gypseous earths mixed with talc, will not unite into a mass in any degree of fire; but if borax be added, the talc readily melts. Thus two parts of talc, two parts of that spar or gypseous matter called *glacies Mariae*, or the common plated spar, with one part of borax, run into a yellow mass resembling a topaz.

The argillaceous earths do not vitrify with talc; but they run into a mass of great hardness, which will give fire with steel, and is very serviceable to make crucibles of, these vessels not suffering the glass of lead to run through them. Talc, joined with the vitrifiable stones, forms no remarkable body, but the mass remains friable; but from these masses, by the addition of proper matter to render them fluid, great variety of elegant compounds may be made. Thus if talc be mixed in equal quantities with powder of flints, on adding to the whole a fourth part of crystal-glass, the whole unites into an opaque but solid white mass. Alkali-salt, added in equal quantity to talc and flint, gives a transparent yellow glass; and white sand, talc, and a fixed alkali, in equal quantities, afford a green glass; with other mixtures of this kind, in different quantities, the resemblances of many beautiful stones are produced; and what is very remarkable, some grains of metalline matter are often found on the surface of the masses.

Cæsalpinus, Aldrovand, and some others affirm, that talc melted with copper, or added to copper, while in fusion, gave it a white colour: this being taken for granted, authors have hence agreed that talc contains an arfemical earth. But experiment shews this to have been a false assertion, in regard to talc; and probably it only owes its origin to the cant language of some of the alchemists, who have called the flowers of zinc talc, though these alone must render copper yellow, not white. Antimony and talc, first calcined with nitre, run in a violent fire into a sort of flint, which will give fire with steel. With regulus of antimony and the black flux, it runs into a black mass; and with bismuth it calcines into a grey powder. So little is there in the proposals of the enemies for the metallization of talc by antimony and bismuth. Mem. de l'Acad. de Berlin, Ann. 1746.

In what part of Mr. Boyle's works the learned author, from whom the foregoing extract was taken, has found that talc may be reduced by common fire to a gypsum in an hour, we know not; but we find that Mr. Boyle says, that the calcination of talc is so very difficult, that eminent chemists have looked upon calxes of talc as counterfeits. Works abr. vol. i. p. 160.

Mr. Boyle mentions the extracting of gold from talc, as having

having sometimes succeeded. See Works abr. vol. i. p. 160. but *vide supra*.

**TALC**, *Philosophic*, a name given by some of the chemical writers to the flowers of zinc.

This substance, dissolved in vinegar, affords what they have in their unintelligible language called *oil of talc*, and extolled as a thing of vast power in the fixing of mercury, and many other imaginary operations; and besides this, they call it a sovereign remedy for all diseases.

**TALCAGUANO**, or **TALCAGUANA**, in *Geography*, a sea-port of Chili, nine miles within the point of the same name, and about six from the town of Conception. This is the principal port in the bay of Conception, and is much the most frequented, as ships that anchor here have not only better ground than in any other part of the bay, but are in some measure sheltered from the north winds. The town, or village, as Peroufe calls it, has been built since the city of Conception was destroyed by an earthquake in 1751: it stands on the river Biobin, and is said to contain 10,000 inhabitants. Here are the episcopal cathedral, the seat of the bishop, and all the religious houses. The government of the adjacent district has been wholly military and ecclesiastical. The country round it is very healthy and fertile. Great numbers of cattle are annually killed for their hides and tallow, which are sent to Lima. About 200,000 dollars' worth of gold is annually collected from the sands in the rivers of this bishopric. The Indians of the country have numerous herds of cattle, and plenty of horses, and live more like the Tartars of Asia than the savages of North America. Ships are here supplied with water, wood, and other necessaries. N. lat.  $36^{\circ}42'$ . E. long.  $73^{\circ}6'$ .

**TALCAGUANO Point**, a cape on the coast of Chili, 11 leagues N.E. of the island of Santa Maria, and 2 N. of Port St. Vincent.

**TALCAN**, a town of Asia, in Tokaristan, besieged by Gengis Khan in the year 1221, and taken after a siege of seven months; 100 miles S.E. of Termed. N. lat.  $36^{\circ}45'$ . E. long.  $67^{\circ}9'$ .

**TALCENSTEIN**, a mountain of Silesia; 4 miles N.N.E. of Loewenberg.

**TALCONAH**, a town of Bengal; 30 miles E. of Goragot.

**TALCOT**, a town of Hindoostan, in Concan; 25 miles N.E. of Goa.

**TALCOTE**, a town of the island of Ceylon; 20 miles W.S.W. of Candy.

**TALCOUS SLATE**, in *Geology*, is considered by some geologists as a variety of clay-slate, but it has a nearer resemblance to mica-slate. The colour is generally a greenish-grey, with a shining lustre, like that of the finer kinds of mica-slate. It is softer than mica-slate, but is frequently divided into laminae by thin seams of quartz, and has a twisted or contorted form. The slate on some of the mountains of the higher Alps, as described by Sauffure, seems to be of an intermediate kind between mica-slate and talcous slate. Talcous slate occurs on the western side of the island of Anglesea, and in many alpine districts, forming beds in clay-slate. See **SLATE**.

**TALDINGA**, in *Geography*, a town of Bengal; 15 miles W. of Bissunpour.

**TALE**, in *Law*. See **COUNT** and **DECLARATION**.

**TALE**, or **TAL**, in *Commerce*, a weight for gold and silver in China, and certain parts of the East Indies; and also a money of account. In China, each tale is 10 maces = 100 candareens = 1000 cash. A tale of fine silver should be worth 1000 cash, which cash is composed of six parts of

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copper, and four of lead, having a square hole in the middle, so that they may be strung on a string or wire; but on account of their convenience for common use, their price is sometimes so much raised, that only 750 cash are given for the tale.

Gold is not considered as money, but as merchandize; and it is sold in ingots of a determinate weight, called by the English "shoes" of gold; the largest of which weighs 10 tales, and the gold is reckoned 94 touch (*i. e.* 94 parts fine in 100), though it is only 92 or 93. Of late, from 100 to 110 tales of silver of 94 touch, have been given for 10 tales of gold of 92 or 93 touch; and sometimes from 110 to 120 tales, or even more, of Spanish dollars, reckoned at 92 touch, have been paid for 10 tales of gold. When gold is exchanged for silver, its price is always valued by the ten-tale weight, and it is sold either above or below touch, as follows: *viz.* if the gold be 96 touch, and sold at 5 under touch, subtract 5 from 96, and 91 remains: then 91 tales of silver are paid for 10 of gold: if gold be sold at 10 above touch, the fineness being still 96, add 10 to 96, and 106 tales of silver are paid for 10 tales of gold. Silver ingots are used as money, and are from  $\frac{1}{2}$  to 100 tales, their value being determined by their weight. In payment of small sums, they sometimes lay the ingot on the fire, and by striking it with a hammer, detach smaller pieces from it. The English reckon the tale of silver at 6s. 8d. sterling, so that 1l. sterling is = 3 tales. The catty of 16 tales weighs 19 oz. 6 dwts. 4 grs. English troy; so that 10 tales would weigh 5792 English grains. Upon the whole, the weight of a Chinese tale may be taken at about 580 grains English troy; and therefore 48 tales = 58 ounces troy weight. One hundred Spanish dollars weigh about 722 tales. The heaviest weight for merchandize (peculiar to the coast of Canton) is called pecul, and contains 100 catties or 1600 tales, with the same decimal division as above. Hence a pecul = 132 lbs. 8 oz. 9 dr. avoirdupois: and a catty = 21 oz.  $3\frac{1}{2}$  dr. avoirdupois.

At Acheen, in the isle of Sumatra, accounts are kept in tales, pardows, mace, copangs, and cashes. A tale = 4 pardows = 16 mace = 64 copangs. The coins of the country are mace and cashes. The mace is a small gold coin weighing nine grains, and worth about 14d. sterling. The cashes are small pieces of tin or lead, 2500 of which usually pass for a mace, subject to occasional variation. In Siam, accounts are kept in catties, tales, ticals or tuals, miams, fanangs, and cowries. The catty is 20 tales: the tale = 4 ticals = 16 miams = 32 fanangs: the fanang is = 800 cowries. In Tonquin, accounts are kept in tales of 10 mace or 100 candareens. The tale weighs here 1 oz. 4 dwt.  $14\frac{1}{2}$  grs. English, which is about 10 grs. more than the Chinese tale. Kelly's Cambist.

**TALED**, in the *Jewish Antiquities*, a sort of habit that the Jews wore, chiefly when they repeated their prayers in the synagogue. Numbers, xv. 38. Deuteronomy, xxii. 12.

It served instead of that square garment they wore heretofore, to which Moses had appointed that they should fasten borders of blue to the four quarters, and fringes or ribbands all along the borders. But at present, that they may not be exposed to the laughter of the people for the too great singularity of their dress, they content themselves with wearing a square piece of cloth underneath, with four tufts at the four corners, and when they meet in the synagogue to say their prayers, they cover their heads with a square woollen veil, which has four tufts at its four corners. It is this they call *thaled*, or *taled*. Calmet, Dict. & Leo of Modena, Ceremonies of the Jews, p. i. ch. 11.

G

TALEGONG,

**TALEGONG**, in *Geography*, a town of Hindoostan, in Dowlatabad; 15 miles S. of Oudighir.—Also, a town of Baglana; 12 miles S. of Chandor.

**TALEKAN**, a town and castle of Persia, in the province of Khorassan; 160 miles N.E. of Herat.—Also, a town of Persia, in the province of Irak; 30 miles N.E. of Hamadan.

**TALENNI**, a town of Japan, in the island of Nippon; 160 miles W.N.W. of Meaco.

**TALENT**, **TALENTUM**, a weight, and a coin, both very famous among the ancients; but very different in different countries.

The value of the talent it is very hard to assign in English money, as being used among all the people throughout the East, and its value, and the manner of computation, being different among each: a difficulty abundantly shewn by Budæus, in his learned treatise “*De Assæ*.”

There were various kinds of talents, both with regard to weight and to species; the value of these last still increasing, as the metal of which they consisted was purer, though the talent weights contained the same number of pounds and drachms. Accordingly, all talent weights are equally sixty minæ, and the mina one hundred drachmæ; but the drachma of one place exceeding that of another, there hence arose a difference in the talents.

The common Attic talent then (the talent weight we mean) contained sixty Attic minæ, or six thousand Attic drachmæ; equal, according to Dr. Arbuthnot’s reduction, to fifty-six pounds, eleven ounces, seventeen and one-seventh grains, English troy weight.

There was another Attic talent, by some said to consist of eighty, by others of one hundred minæ. The Egyptian talent was eighty minæ; the Antiochian also eighty; the Ptolemaic of Cleopatra eighty-six and two-thirds; that of Alexandria ninety-six; the Insular talent one hundred and twenty; and that of Antioch three hundred and sixty minæ. In the valuation of money, the Grecian talent, according to Dr. Arbuthnot, was equal to sixty minæ, or reckoning the mina at 3*l.* 4*s.* 7*d.* equal to 193*l.* 15*s.*; the Syrian talent in this valuation consisted of fifteen Attic minæ; the Ptolemaic of twenty; the Antiochian of sixty; the Euboic of sixty; the Babylonian of seventy; the greater Attic of eighty; the Tyrian of eighty; the Egeian of one hundred; the Rhodian of one hundred; and the Egyptian of eighty minæ. (See Arbuthnot’s *Tables of Ancient Coins*, &c. p. 33, and Tab. 18, 19, 23, 24.) Stating the Attic drachm of silver at nine-pence of our money, the best medium value, the mina of Athens will be worth 3*l.* 15*s.*; and the Athenian common talent, 225*l.*; and the rest may easily be estimated in proportion.

But Mr. Raper makes the Attic talent, which consisted of sixty minæ, or six thousand drachmæ, each drachm being equal to sixty-six grains and a half troy weight, or 3*l.* 17*s.* 4*d.* sterling, equal to 232*l.* 3*s.* See **DRACHM**.

This ingenious writer also observes, that historians and others mention the Egeian and the Euboic talent. The former weighed ten thousand Attic drachms; but, like other talents, contained only six thousand of its own; which being so much heavier than the Attic, the Athenians called it *παραχρον δραχμης*, or the thick drachm. This talent was used at Corinth; and in a passage of Aulus Gellius, lib. i. c. 8. it is valued at ten thousand Attic drachms; and was probably used in most of the cities of Peloponnesus. If the Attic drachm weighed sixty-six and a half troy grains, the Egeian should weigh one hundred and ten and five-sixths, which Mr. Raper states at one hundred and eleven. This

Egeian talent he concludes from the mean drachm of six Macedonian coins, which he found to be one hundred and eleven grains and one-fourth, must have been the standard of the Macedonian money, till Philip changed it. And it appears likewise to have been the standard of the Ptolemaic money in Egypt. Pliny indeed (*Nat. Hist. lib. xxxiii. c. 3.*) tells us, on the authority of Varro, that the Egyptian talent weighed eighty Roman pounds; but he supposes that this is a false reading, and that for Ægyptium we should read Euboicum: for Pliny is speaking of the riches of Asia, where the Euboic talent was used for weighing gold; and it is known, that the weight of that talent was settled at eighty Roman pounds, by the treaty between the Romans and Antiochus. There is a passage in Pollux (*lib. ix. c. 6. § 86.*) which makes the Egyptian talent contain fifteen hundred Attic drachms. But this, he apprehends, is an injudicious interpolation in the last collection of that author.

The Euboic talent, says this writer, certainly came from Asia; for Herodotus (*lib. iii. sect. 89.*) tells us, the kings of Persia weighed their gold by that talent: in the same place he informs us, that the Babylonian talent weighed seventy Euboic minæ. Pollux says, it weighed seventy Attic minæ. Therefore the Euboic talent should be equal to the Attic. But Ælian (*Var. Hist. lib. i. c. 22.*) tells us, that it weighed seventy-two Attic minæ; and if so, the Euboic talent should be heavier than the Attic, in the proportion of seventy-two to seventy. By two passages, cited by Mr. Raper, from Xenophon, *Exped. lib. i.* it appears probable, that the Babylonian talent weighed above seventy Attic minæ, and above seventy Euboic minæ; and if Pollux took his value of the Babylonian talent from Herodotus, as the text now stands, and Ælian his value of the same from a more correct copy of that author, or from some better authority, the Euboic talent must have been equal to the Attic. Accordingly it contained six thousand Attic drachms. *Phil. Transf. vol. lxi. part ii. p. 483, &c.*

There is another talent much more ancient, and much less than any of those already mentioned, which Dr. Arbuthnot calls the Homeric talent of gold, supposed, he says, to be equal to three Attic aurei. Pollux speaks of such a talent. Eustathius upon Homer reckons it worth twenty-four drachmæ. That its value was small, whether fixed or uncertain, is conjectured from the passage of Homer, where, describing the prizes at the funeral of Patroclus, two talents of gold are proposed as a more inconsiderable prize than a mare with foal, &c. Hence Mr. Raper, *ubi supra*, p. 527, concludes, that it was the same that the Dorian colonies carried to Sicily and Calabria: for Pollux tells us, from Aristotle, that the ancient talent of the Greeks in Sicily contained twenty-four nummi, each of which weighing an obolus and a half, the talent must have weighed six Attic drachms, or three darics; but the daric weighed very little more than one guinea; and if two talents weighed about six guineas, we may reckon the mare with foal worth twelve; which was no improbable price, since we learn from a passage in the *Clouds* of Aristophanes, that, in his time, a running horse cost twelve minæ, or above forty-six pounds sterling; therefore this seems to have been the ancient Greek talent, before the art of stamping money had introduced the greater talents from Asia and Egypt.

According to this ancient talent, says Dr. Arbuthnot, some reckon the treasure of king David, particularly that mentioned *1 Chron. xxii. 14.* which, according to the common reckoning, would amount in gold talents to the value of 547,500,000*l.* and the silver to above 342,000,000*l.*; or reckoning according to the decuple proportion of gold to silver,

silver, the two sums would be equal. As David reigned in Judea after the siege of Troy, it is not improbable but Homer and he might use the same numeral talent of gold.

It is suggested by Mr. Pinkerton (Essay on Medals, vol. i. p. 65.) that all the ancient coins of Asia, Africa, Greece, Magna Græcia, and Sicily, were reducible to three talents or standards. 1. That of Egina, used in most of the more ancient silver coinages; and as it would seem in even the later of Egypt, Carthage, Greece, &c. 2. The Attic, being the Asiatic gold standard; afterwards used by Phidon, king of Argos, in estimating gold, and called Euboic, from Eubœa, one of the quarters of the city of Argos. It was afterwards used in Athens, and the greater part of the world, as the standard both of gold and silver. 3. The Doric, or Sicilian talent, of 24 nummi, each worth an obolus and a half: whence the talent is estimated at six Attic drachms, or three darics. These weights continued to be the standard of money after it began to be distinguished by impression; nay, to the fall of Greece, and prevalence of the Roman empire.

Among the Romans there were two kinds of talents, the *little* and the *great* talent; the little was the common talent; and whenever they say simply *talentum*, they are to be understood of this: the *little* talent was sixty minæ or Roman pounds; the mina, or pound, estimated at one hundred drachmæ, or denarii: it was also estimated at twenty-four great sesterces, which amounted to sixty pounds.

The *great* talent exceeded the less by one-third part. Budæus computes, that the little talent of silver was worth 75*l.* sterling; and the greater 99*l.* 6*s.* 8*d.* sterling. The greater of gold was worth 1125*l.* sterling.

TALENT, as a *species*, or *money*, among the Hebrews, was sometimes used for a gold coin, the same with the *shekel* of gold, called also *stater*, and weighing only four drachms. The Hebrews reckoned by these talents as we do by pounds, &c. Thus a million of gold, or million of talents of gold, among them, was a million of shekels, or nummi; the nummus of gold being the same weight with the shekel, *viz.* four drachms.

But the Hebrew talent weight of silver, which they called *cicar*, was equivalent to that of three thousand shekels (Exod. xxxviii. 25. 28.) or one hundred and thirteen pounds, ten ounces, one pennyweight, ten grains and two-sevenths, English troy weight, according to Arbuthnot's computation.

It should be observed, however, that the talent was not every where the same. The Hebrew talent weighed more than that of the Greeks, and is said to have amounted to 341*l.* 10*s.* 4*d.* and  $\frac{1}{2}$ . The common Attic talent might be worth about 193*l.* 15*s.* which might probably have been used by the Jews in their commerce.

TALES, in *Law*, a supply or addition of men for those impannelled on a jury of inquest, and not appearing, or at their appearance challenged by either party as not indifferent.

In such case, the judge, upon motion, grants supply to be made by the sheriff of one or more tales, such as are present in court, equal in reputation to those impannelled. For this purpose, a writ of *decem tales*, *octo tales*, and the like, was used to be issued to the sheriff at common law; and must be still so done at the trial at bar, if the jurors make default; but at the assizes, or nisi prius, by virtue of the statute 35 Hen. VIII. c. 6. and other subsequent statutes, the judge is impowered, at the prayer of either party, to award a *tales de circumstantibus*, of persons present in court, to be joined to the other jurors to try the cause; who are liable, however, to the same challenges as the principal jurors. This is usually done till the legal number of twelve be com-

pleted. The *tales de circumstantibus* is in some measure rendered useless by the statute for regulating juries, 3 Geo. II. c. 25. See CHALLENGE and JURY.

TALGA, in *Geography*, a town of Hungary; 8 miles N. of Tokay.

TALGARTH, a small town in a hundred of the same name, and county of Brecon, South Wales, is situated on the banks of the river Llyfni, at one end of the Black Mountains, which stretch hence into Herefordshire: from its situation it derived its name; Talgarth meaning literally the front of the hill. The town is a borough by prescription, but without privilege, jurisdiction, or municipal officers. The parish church is a substantial edifice, but has no architectural elegance, nor is it enriched by any remarkable monuments, ancient or modern: it has a tower, which forms a conspicuous object from most parts of the surrounding country. The population of the parish, which, besides the borough, contains five hamlets, was in the year 1811 returned to parliament as 1124, the number of houses being 274. No less than eight annual fairs are held here.

In the Forest hamlet of the parish of Talgarth are some vestiges of Dinas-castle, which, at a remote period, was a fortress of importance, but has long since been demolished. In Leland's time, it was "ruin almost to the hard ground." From his description, it must have been of considerable dimensions. It consisted of three wards "waulid about," and had three parks and a forest attached to it. From the same writer we learn, that the castle was destroyed by the natives, that it might not be occupied by the favourers of Owen Glendwr.—*Beauties of England and Wales*, vol. xviii. South Wales, by T. Rees, F.S.A. Carlisle's Topographical Dictionary of Wales.

TALGAUTPORAM, a town of Hindoostan, in Mysore; 6 miles S. of Bangalore.

TALGRISTAN, a town of Persia, in the province of Irak; 50 miles E. of Nehavend.

TALGUL, a town of Hindoostan, in Mysore; 10 miles S.S.W. of Sirpy.

TALHA-KIAMEN, a post of Chinese Tartary. N. lat. 46° 16'. E. long. 123° 44'.

TALHAM, a town of Austria; 2 miles S.S.W. of Voglabruck.

TALI, a town on the W. coast of the island of Formosa. N. lat. 23° 36'. E. long. 129° 41'.

TA-LI, a city of China, of the first rank, in Yun-nan. This is the principal place where they make curious tables, and other ornaments of fine marble, which is got from a mountain called *Tienfung*, and is naturally beautified with different colours, in the form of mountains, flowers, trees, and rivers. Ta-li has under its jurisdiction four cities of the second order, and three of the third; 1205 miles S.W. of Peking. N. lat. 25° 45'. E. long. 100°.

TALIA, in *Ancient Geography*, a town of the Upper Mœsia, on the route from Viminatum to Nicomedia. Aut. Itin.

TALJARA, in *Geography*, a town of Bengal; 46 miles S. of Curruckdeah.

TALIFAY, a town on the N. coast of the island of Luçon. N. lat. 14° 21'. E. long. 123° 24'.

TALIGALEA, in *Botany*, an unexplained name, Aublet Guian. 625. t. 252. Juss. 109, appears to be the same genus, and even the same species, as AMASONIA of Linnæus. (See that article.) The fruit of the latter having been examined in a drier state, may solve all the difficulty.

Aublet describes his only species, *T. campestris*, as an herb with a perennial root, sometimes creeping. Stems annual,

two or three feet high, simple, leafy, downy. *Leaves* alternate, stalked, elliptical, pointed, from three to six inches long, downy, with tooth-like serratures. The variety with a creeping root has smooth leaves, and we should presume it may be a distinct species. The *flowers* are yellow, about an inch long, numerous, in a long compound cluster, with ovate purple bractes. *Berry* black, with two hard seeds.—This plant grows abundantly in the sandy meadows of the island of Cayenne, as well as on the continent of South America, bearing flowers and fruit all summer long.

TALIGONG, in *Geography*, a town of Hindoostan, in the Carnatic; 7 miles N. of Terriore.

TALIGOV, a town of Russia, in the government of Riga; 24 miles N. of Dorpat.

TALIHOU, a small island, with a lazaretto, on the coast of France. At low-water the land which joins to the continent is dry; 3 miles N. of La Hogue. N. lat. 49° 36'. W. long. 1° 9'.

TALINA, a town of Peru; 50 miles E.S.E. of Lipes.

TALIN-HO, a town of Chinese Tartary. N. lat. 41° 10'. E. long. 120° 50'.

TALINUM, in *Botany*, a genus of Adanson's, well separated by him from the Linnæan PORTULACA. (See that article.) Its name no one, not even De Theis, has undertaken to explain; Adanson having given so many barbarous, and even arbitrary ones, that the inquiry might well be deemed alike hopeless and unprofitable. We conjecture, however, that he must have had in his mind the verb *θαλλω*, to be verdant, or flourishing, and consequently *θαλλος*, or *θαλλια*, a green bough; for he often wrote words with a *T* which in Greek begin with a *θ*; and the above idea is suitable enough to the succulent, and durably verdant, habit of the genus. We hence learn the true accentuation of the word, *Talinum*. Ehrhart called this same genus *Rülingia*, after Dr. John Philip Rülings, who published at Göttingen, in 1774, a catalogue of the genera of plants, disposed in natural orders. Linnæus had formerly distinguished it by the name of *Anacampteros*.—Adanf. Fam. v. 2. 245. Juss. 312. Willd. Sp. Pl. v. 2. 862. Ait. Hort. Kew. v. 3. 148. Pursh 365. Lamarck Illustr. t. 402. Gærtn. t. 128. (Rülingia; Ehrh. Beitr. v. 3. 132. *Orygia*; Forsk. Ægypt.-Arab. 103. *Anacampteros*; Linn. Gen. ed. 1. 152. Sims in Curt. Mag. p. 1367.)—Class and order, *Polyandria Monogynia*. (Dodecandria Monogynia, Willd.) Nat. Ord. *Succulentæ*, Linn. *Portulacæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of two or five oblong, rather unequal, permanent leaves. *Cor.* Petals five, spreading, ovate, obtuse, as long or longer than the calyx. *Stam.* Filaments numerous, capillary, not half so long as the corolla; anthers incumbent, oblong. *Pist.* Germen superior, roundish; style simple, about as long as the corolla; stigmas three, oblong, reflexed. *Peric.* Capsule ovate, of one cell, and three, five, or six valves. *Seeds* numerous, roundish, affixed to a globular central receptacle.

Ess. Ch. Petals five. Calyx of two or five leaves. Capsule superior, with from three to six valves, one cell, and many seeds.

Section 1. *Stipulas none. Seeds without wings.*

1. *T. triangulare.* Triangular-stalked Yellow Talinum. Willd. n. 1. Ait. n. 1. (*Portulaca triangularis*; Jacq. Amer. 147. Obs. falc. t. 35. t. 23. *P. racemosa*; Linn. Sp. Pl. 640. *Helianthemum frutescens*, portulacæ folio; Plum. Ic. 142. t. 150. f. 2.)—Leaves flat, channelled, wedge-shaped, emarginate, with a small point. Cluster simple, with a triangular stalk. Stem spreading.—Native of the sea-shores of the West Indies. Cultivated in Chelsea garden in 1739. Mr. Aiton says it blossoms in the stove,

most part of the summer. The stem is shrubby, two feet high, round, smooth, branched, decumbent in the lower part. *Leaves* scattered, about one and a half or two inches long, succulent, smooth, shining, brittle, entire at the edges; occasionally convex, being reflexed at the sides, tapering at the base into a short footstalk. *Flowers* two or more, on a terminal triangular stalk, very elegant, of a brilliant yellow, without scent. *Calyx* of two leaves. *Capsule* with three valves.

2. *T. crassicaule.* Thick-stemmed Red Talinum. (*T. crassifolium*; Willd. n. 2. *T. patens*; Andr. Repof. t. 253. Ait. n. 2. *Portulaca crassicaulis*; Jacq. Hort. Vind. v. 3. 29. t. 52. *P. crassifolia*; Murray in Linn. Syft. Veg. ed. 14. 446.)—Leaves flat, obovate, entire at the point. Corymbs compound, elongated. Stem erect.—Native probably of the West Indies. Jacquin cultivated it at Vienna, and we have seen it flowering in many of the English stoves. This differs from the former in its more erect and thicker stem, as well as in the fine pink colour of its flowers. The leaves moreover are not emarginate. The corymbose, or panicle, many-flowered stalks, at first terminal, are sometimes overtopped by the aggregate leafy branches, and thus become lateral, or axillary. Murray, from mere inadvertence in transcribing, altered Jacquin's original name, for one which has here no appropriate meaning.—Willdenow seems to have copied him, without seeing the work of Jacquin; which from this, and some other instances, we suspect he had not in his possession. We do not think it necessary to perpetuate such an error, any more than that of Andrews, who took this plant for Willdenow's *T. patens*, see n. 4.

3. *T. fruticosum.* Shrubby White Talinum. Willd. n. 7. (*Portulaca fruticosa*; Linn. Syft. Veg. ed. 13. 371. *P. paniculata*; Linn. Sp. Pl. 640. *P. americana latifolia* erecta, floribus albis; Comm. Hort. v. 1. 7. t. 4.)—Leaves flat, obovate, somewhat emarginate. Corymbs compound, elongated. Stem erect. Calyx of five leaves.—Native of the West Indies, or of South America. This species, a stranger to our gardens, appears to differ essentially from the two foregoing in having five leaves to the calyx, instead of two; and to say nothing of the white petals. In habit, leaves, and inflorescence, it comes very near the last. The capsule is said to consist of three valves in both.

4. *T. patens.* Panicle Red Talinum. Willd. n. 4. Haworth Succ. Pl. 123. (*T. paniculatum*; Gærtn. v. 2. 219. *Portulaca patens*; Linn. Mant. 242. Jacq. Hort. Vind. v. 2. 71. t. 151. *P. paniculata*; Jacq. Amer. 148.)—Leaves flat, obovate, obtuse. Panicle repeatedly compound, forked, many-flowered.—Native of rocks on the sea-coast of Martinico and Hispaniola. Jacquin. We have seen it in the English stoves, as Mr. Haworth likewise appears to have done, when he remarks that the *patens* of Andrews is a widely different plant. (See our 2d species.) That before us has an upright shrubby stem, one and a half or two feet high, branched; somewhat quadrangular below. Leaves scattered, or imperfectly opposite, obovate, lanceolate or oval, more or less obtuse, very smooth and juicy; the lower ones three inches long, the rest shorter; all tapering at the base into a short footstalk. Panicles solitary at the top of the stem and branches, erect, from six to ten inches long, with numerous, mostly opposite, repeatedly subdivided, and partly forked, slender, smooth, spreading stalks, accompanied here and there by small lanceolate bractes at their base. Flowers numerous, small, inodorous. Calyx of two orbicular, concave, red, widely spreading leaves. Petals five, obovate, red, thrice the size of the calyx, likewise widely spreading. Capsule globose, smaller than a pepper-corn, its three valves, which Jacquin describes as double, or of

two layers, suspended from the top of three intermediate fibres. See Gærtner's figure and description, where the synonym of Commelin, which belongs to the foregoing, is very erroneously cited for the present species. This must have arisen from Linnæus's having once called the former *Portulaca paniculata*, and Gærtner's having copied the above synonym without examination.

5. *T. reflexum*. Panicle Yellow Talinum. Cavan. Ic. v. 1. t. 1. Haworth Succ. Pl. 124. Curt. Mag. t. 1543. Ait. Epit. 375. (*T. patens* β; Willd. n. 4.)—Leaves somewhat convex, elliptic-lanceolate, acute. Panicle twice compound, many-flowered.—Native of South America.—An annual or biennial, scarcely shrubby, plant in our stoves. Mr. Haworth observes, it is more tender, and much taller, than the last, of which Willdenow thought it a mere variety. We are not sure that the differences indicated in our specific characters are sufficient or permanent, not having had an opportunity of comparing the two plants. The flowers of *T. reflexum* being yellow, seems an important distinction in this genus. Both species are said to be abundantly propagated by seed.

6. *T. cuneifolium*. Wedge-leaved Talinum. Willd. n. 5. (*Portulaca cuneifolia*; Vahl Symb. v. 1. 33. *Orygia portulacifolia*; Forsk. Ægypt.-Arab. 103.)—Leaves flat, wedge-shaped, obtuse, with an occasional point. Panicle many-flowered; its lower branches umbellate, three-flowered.—Native of Arabia Felix.—A shrub three feet high. Leaves eatable, alternate, spreading, sessile, tapering at the base, about an inch long, thick and smooth. Calyx of two unequal leaves, deciduous. Petals of a violet red. Stamens green, with yellow anthers. Capsule three-angled, of three valves. Seeds black, compressed, smooth. Forskall.—Vahl says this species is akin to *T. patens*, n. 4, but differs in having thicker flower-stalks, the lower ones bearing three-flowered umbels.

7. *T. decumbens*. Decumbent Glauous Talinum. Willd. n. 6. (*Portulaca decumbens*; Vahl Symb. v. 1. 33. *Orygia decumbens*; Forsk. Ægypt.-Arab. 103.)—Leaves flat, obovate, pointed. Clusters axillary. Stem decumbent. Calyx of five leaves.—Native of Arabia Felix, in stony places near Musa, but not common. Forskall. Stem shrubby, with angular branches, clothed, like the rest of the plant, with a glaucous mealiness. Leaves distant, stalked, thickish, somewhat wavy. Clusters from the bosoms of the uppermost leaves, with an awl-shaped seale, or bractea, opposite to each partial stalk. Capsule of five valves. Vahl.—Forskall describes numerous lanceolate petals, about twenty, of a reddish violet; and five cells, as well as valves, to the capsule.

8. *T. teretifolium*. Cylindrical-leaved Talinum. Pursh n. 1.—“Leaves cylindrical, fleshy. Corymbs stalked, terminal.”—On sunny rocks in Delaware and Virginia, flowering in July. Perennial. Flowers purple. Pursh.

Section 2. *Stipulas* within side of the leaves, jagged. Seeds winged.

9. *T. Anacamperos*. Round-leaved Talinum. Willd. n. 3. Ait. n. 3. “Decand. Pl. Grasses, t. 3.” (*Rülingia Anacamperos*; Ehrh. Beitr. v. 3. 133. Haworth Succ. Pl. 124. *Portulaca Anacamperos*; Linn. Sp. Pl. 639. *P. africana* sempervirens, flore rubicundo; Comm. Hort. v. 2. 177. t. 89. *Telephium folio globofo*; Dill. Elth. 375. t. 281.)—Leaves ovate, acute, smooth; convex and tumid beneath. Stipulas filamentous, many times shorter than the leaves. Petals obovate.—Native of the Cape of Good Hope. Cultivated by Sherard in 1732. A greenhouse plant, flowering in July. A humble shrubby species, whose extremely thick and succulent leaves, about an inch long, give it the habit of an *Aloc.* They are sessile, of a pale glaucous green, not

shining; their upper side nearly flat, with a longitudinal furrow; the under very convex. *Stipulas* short, in many capillary segments. Flowers crimson, the size of our second or third species, in long-stalked terminal simple clusters, which are sometimes two together. Calyx of two leaves. Petals somewhat pointed. The seeds are said to be winged. Ehrhart calls them *arillata*, tunicated.—The specific name, borrowed from Pliny, derived from *ανακαμπερα*, to return, and *σποα*, love, was at first adopted by Linnæus as a generic appellation for the present plant, when he considered it as a distinct genus from *Portulaca*, in his earlier publications. But this name, and the foolish superstition to which it alludes, of the very touch of the herb restoring alienated love, rather belongs to the *Sedum Anacamperos* of Linnæus, and its near relation *S. Telephium*. See *SEDUM*.

10. *T. arachnoides*. Cobweb Talinum. Ait. n. 4. (*Anacamperos arachnoides*; Sims in Curt. Mag. t. 1368. *Rülingia arachnoides*; Haworth Succ. Pl. 125.)—Leaves elliptical, acute; slightly convex, and covered with cobweb-like down above; tumid beneath. Stipulas filamentous, shorter than the leaves. Petals elliptical.—Found by Mr. Masson at the Cape of Good Hope, and sent to Kew about the year 1790. It is treated like the last, and agrees with that species in general habit, though smaller in size. The leaves are less glaucous; the lower ones covered with a kind of web. *Stipulas* longer and more robust. Flowers white, with a faint blush. Seeds observed by Mr. Haworth to be less winged.—The leaves are represented in the Botanical Magazine with a tinge of purplish-brown. Perhaps Mr. Haworth's *Rülingia rubens*, n. 3, may be only a higher-coloured variety.

11. *T. filamentosum*. Thready Talinum. Ait. n. 5. (*Anacamperos filamentosa*; Sims in Curt. Mag. t. 1367. *Rülingia filamentosa*; Haworth Succ. Pl. 125.)—Leaves ovate, bluntish, tumid and covered with cobweb-like down on both sides. Stipulas filamentous, longer than the leaves. Petals lanceolate.—Found by Mr. Masson, at the Cape of Good Hope, and sent to Kew a few years after the last, from which it differs in having smaller, blunter leaves, and much longer, more conspicuous, stipulas, whose segments are linear and flattened, like shavings of horn. The petals are rose-coloured, and elliptic-lanceolate, very fugacious, as in the two foregoing species. We have never seen Mr. Haworth's *Rülingia lanceolata*, n. 5, but it seems, by his definition, nearly akin to this.

The winged seeds can hardly entitle the species of this section to form a separate genus, there being so little difference in habit. If they did, the name of *Rülingia* must certainly be preferred to *Anacamperos*, the latter, notwithstanding its right of priority, having been arbitrarily and erroneously applied to these Cape plants, with which the ancients were of course unacquainted. See our remark under the 9th species.

**TALIO**, *Lex Talionis*, or *Pæna Talionis*, a retaliation, or punishment, by which an evil is returned perfectly like that committed against us by another; which is what we usually express by the words, *eye for eye, tooth for tooth*.

The *pæna talionis* was enjoined by the law of Moses, among the Jews; it was esteemed a natural piece of justice, and yet the Romans set it aside, inasmuch as such a parity or equality of punishment could not always be observed. For this reason the prætor allowed such as had suffered an injury to make an estimate of it in money, that justice might be done him that way; only referring to himself the power of moderating the same. And this was what was constantly practised, and thus the *pæna talionis* became quite disused with them.

**TALISIA**, in *Botany*, a barbarous name of Aublet's, which

which he appears to have fabricated out of the Caribbean appellation of the plant in question, *Toulichi*. We should be inexcusable in giving more than a temporary sanction to such a name, till the genus is either better known than at present, or set altogether aside.—Aubl. Guian. 349. Juss. 247. Lamarck Illustr. t. 310.—Class and order, *Odandria Monogynia*. Nat. Ord. *Sapindi*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, acute segments. *Cor.* Petals five, ovate, inserted into the orbicular receptacle of the flower beneath the germen. Nectary of five short, hairy, upright scales, one inserted into the base of each petal, covering the stamens. *Stam.* Filaments eight, short, inserted into the orbicular receptacle; anthers oblong, of two cells. *Pist.* Germen superior, minute, roundish, of four cells; style one, very short; stigma simple, obtuse. *Peric.* unknown.

Ess. Ch. Calyx in five deep segments. Petals five. Nectary of five hairy scales, attached to the petals. Germen of four cells.

1. *T. guianensis*. Toulichi of Guiana. Aubl. Guian. 349. t. 136.—Native of banks of rivers in Guiana, flowering in October.—A shrub, whose trunk is three or four feet high, and as many inches in diameter, with a greyish bark, and whitish wood; the branches long, compound, variously spreading. *Leaves* alternate, pinnate, very large, each consisting of about thirty alternate, stalked, elliptic-lanceolate, pointed, entire, smooth, veiny leaflets, besides an odd one, from five to six inches long, and above one broad. *Clusters* axillary and terminal, doubly compound, many-flowered, all over of a fine rose-colour, with a small scaly bractea under each subdivision. *Flowers* small, in little tufts, nearly sessile.—Nothing is known of the fruit, except that the germen has four cells, nor is any thing recorded concerning the qualities or uses of this plant.

TALISKERAN, in *Geography*, a town of Persia, in the province of Adirbeitzan; 100 miles N.N.E. of Ardebil.

TALISMANS, magical figures engraven or cut under certain superstitious observances of the characterisms and configurations of the heavens; to which some astrologers, hermetical philosophers, and other adepts, attribute marvellous virtues, particularly that of calling down celestial influences.

The word is pure Arabic; though Menage, after Salmafius, thinks it may come from the Greek *ταλίσμα*, operation, or consecration. Borel says it is Persian, and signifies literally an engraven constellation. Others derive it a *talamacis literis*, which are mysterious characters, or cyphers, used by forcerers, thus called from *talamasca*, a phantom, or illusion.

The author of a book, entitled, *Talismans justifiez*, says, a talisman is the seal, figure, character, or image of a heavenly sign, constellation, or planet, engraven on a sympathetic stone, or on a metal corresponding to the star, &c. in order to receive its influences.

The talismans of the Samothracians, so famous of old, were pieces of iron, formed into certain images, and set in rings, &c. They were held preservatives against all kinds of evils. There were other talismans taken from vegetables, and others from minerals.

In the general, we may distinguish three kinds of talismans. *Astronomical*, which are known by the signs or constellations of the heavens engraven on them, with other figures, and some unintelligible characters. *Magical*, which bear very extraordinary figures, with superstitious words and names of angels unheard of. And *mixt*, which consist of signs, and barbarous words; but have no superstitious ones, or names of angels.

Some rabbins maintain, that the brazen serpent, raised by Moses in the wilderness, for the destruction of the serpents that annoyed the Israelites, was properly a talisman.

All the miraculous things wrought by Apollonius Tyanæus are attributed to the virtue and influence of talismans: and that wizard is even said by some to have been the inventor of talismans.

Some authors take several Runic medals, at least medals whose inscriptions are in Runic characters, for talismans; it being notorious, that the northern nations, in their heathen state, were much devoted to them. M. Keder, however, has shewn, that the medals here spoken of are quite other things than talismans.

TALISSE, in *Geography*, a small island in the East Indian sea, near the N. coast of the island of Celebes. N. lat.  $1^{\circ} 40'$ . E. long.  $124^{\circ} 50'$ .

TALK, in *Minerology*. See TALK.

TALKAN, in *Geography*, a town of Persia, in the province of Irak; 30 miles E. of Sultania.

TALKEAVE, a town of Persia, in Khorassan; 50 miles E. of Tabaskili.—Also, a town of Persia, in Segeftan; 21 miles S.W. of Kim.

TALKHAN, a town of Grand Bucharia; 80 miles S.S.W. of Balk.

TALKING. See SPEAKING.

TALLAGH, in *Geography*, a post-town of the county of Dublin, Ireland, where is the ancient and noble residence of the archbishops of Dublin; 5 miles S.W. by W. from Dublin.

TALLANO, a town of Corsica, and capital of a district, in the department of the Liamone, situated in a bay of the Mediterranean, called the "Gulf of Tallano;" 30 miles S.S.W. of Corte. N. lat.  $41^{\circ} 33'$ . E. long.  $9^{\circ} 11'$ .

TALLAPOUR, a town of Hindoostan, in Oude; 22 miles N.E. of Lucknow.

TALLARAPESCET, a town of Persia, in the province of Mazanderan; 21 miles S. of Fehrad.

TALLARD, a town of France, in the department of the Higher Alps, on the Durance; 9 miles S. of Gap.

TALLARO, in *Commerce*, a silver coin of Tuscany, Venice, and Ragusa. At Florence the tallaro is = 6 lire or 9 paoli, the lire being worth about 8d. The new tallari of Ragusa, called libertine, coined between 1791 and 1794, are of the weight of 1 oz. 10 carats, containing 9 parts of pure silver to 6 of alloy; and the value of the tallaro was reckoned at 80 grossetti. Since 1796 there have been coined ducats of 40 grossetti, containing 9 parts of pure silver and 11 of alloy. The ducat of 1796 is worth  $13\frac{1}{4}d.$  sterling, which is nearly the value of the Turkish piastre of the latest coinage.

By Mr. Bingley's assay, the mint price of silver in England being 5s. 2d. per ounce standard, the tallaro of Venice ( $\frac{1}{2}$ , &c. in proportion) is worse than English standard (W.) 1 oz. 3 dwts., its weight 18 dwts.  $10\frac{3}{4}$  grs., its content in pure silver 367.1 grs., and value in sterling 4s.  $3\frac{1}{4}d.$  The tallaro and its divisions are marked with the head of a woman, legend, *Repubblica Veneta*; reverse, a winged lion, and a book; legend, the reigning doge's name, thus *Paulo Rainario duca*.

The assay of the tallaro of Ragusa, or Ragusan of 1759, is W. 4 oz. 2 dwts., its weight 18 dwts.  $7\frac{1}{2}$  grs., its content in pure silver 256.4 grs., and its sterling value 2s.  $11\frac{3}{4}d.$  That of 1774, W. 4 oz. 4 dwts., weight 18 dwts.  $8\frac{1}{2}$  grs., content in pure silver 253.3 grs., and value 2s.  $11\frac{1}{4}d.$  That of 1794, W. 3 oz. 19 dwts., weight 18 dwts.  $17\frac{1}{4}$  grs., content 267.6 grs., and sterling value 3s.  $1\frac{1}{4}d.$  The ducat of

1797, W. 5 oz. 11 dwts., weight 8 dwts.  $17\frac{1}{4}$  grs., content 97 grs., and value 1s.  $1\frac{1}{2}d$ .

The tallaro of Ragusa is marked with the head of the chief magistrate, called the rector; legend, *Rector Reip. Rhacusin*; reverse, arms of the city; legend, *Ducat et Sem. Reip. Rac.* In the Levant, and other places, the term tallaro is applied to dollars in general. Kelly's Cambist.

TALLEVENDE, in *Geography*, a town of France, in the department of the Calvados, containing near 3000 inhabitants, chiefly employed in the manufacture of earthenware; 2 miles S.W. of Vire.

TALLIAGE, TALLAGIUM, a certain rate, according to which barons and knights were anciently taxed by the king towards the expences of the state, and inferior tenants by their lords, on certain occasions.

That raised to the king was on his demesnes, escheats, and wardships, and upon the cities and burghs of the realm. When it was paid out of knights' fees, it was called *scutage* (which fee); when by cities and burghs, *talliage*; when upon lands not of a military tenure, *hidage*; which fee.

This latter talliage of the customary tenants was sometimes fixed and certain, and sometimes at the pleasure of the lord; and was also sometimes compounded for.

Talliages were anciently called *cuttings*; which name is still retained in Ireland, though in a different signification.

Talliage, says sir Ed. Coke, is a general name including all taxes; and is derived from the French *taille*, *tax*, founded on the tally of petty tradesmen; as the country people appointed to collect it, not being able to write, scored down what they received on tallies. See LAND-TAX and SUBSIDY.

TALLIKA, in *Geography*, a town of Africa, in the kingdom of Bondou, inhabited by Foulahs of the Mahometan religion, in the road of the caravans; 70 miles W.S.W. of Fatteconda. N. lat.  $13^{\circ} 56'$ . W. long.  $11^{\circ} 40'$ .

TALLIPOUR, a town of Hindoostan, in Bahar; 10 miles S.E. of Hajypour.

TALLIS, THOMAS, in *Biography*, the master of Bird, and one of the greatest musicians, not only of this country, but of all Europe, during the 16th century, in which many able contrapuntists flourished.

He was born early in the reign of Henry VIII.; but though it has frequently been asserted that he was organist of the chapel royal during the reigns of that monarch, Edward VI., queen Mary, and queen Elizabeth, yet it would be difficult to prove that, in the three first of these reigns, laymen were ever appointed to any such office. In the reign of Henry, and his daughter Mary, when the Roman Catholic religion prevailed, the organ, in convents, was usually played by monks; and in cathedrals and collegiate churches and chapels, by the canons, and others of the priesthood. The first lay organists of the chapel royal upon record were Dr. Tye, Blithman, the master of Dr. Bull, Tallis, and Bird; all during the reign of queen Elizabeth.

Though the melody or plain-song of the cathedral service was first adjusted to English words by Marbeck, yet Tallis enriched it with harmony. Indeed the melody used by Tallis is not exactly similar to that of Marbeck, it is only of the same kind; consisting of fragments of the ancient ecclesiastical canto fermo. But the harmony in which he has clothed it is admirable; and the modulation being so antique, chiefly in common chords or fundamental harmony to each note of the diatonic scale, often where the moderns have sixths, sevenths, and their inversions, produces a solemn and very different effect from any music that has been composed during the last century. As all melody, in which the semitones are avoided, must resemble that of Scotland;

so all harmony, in which neither the *tritonus* nor false fifth occurs, and where the second, third, and sixth of the key, are only accompanied with common chords, must remind us of that which prevailed in the sixteenth century; and though fo ancient, appear new to our ears, from its long disuse.

There are two compositions by Tallis for the organ, preserved in queen Elizabeth's Virginal Book, one of which is dated 1561, and the other 1564; both built upon a dull and unmeaning ground, or fragment of plain-chant (*felix namque*), and both alike dry, elaborate, and difficult, to hands formed by modern music. The little melody and rhythm in the compositions of these times required all the harmony that could be crowded into them. Notes are multiplied without end, and difficulties created without effect. It is not by the instrumental music, which had been but little cultivated, that we must judge of the genius of old masters; but by vocal, in parts: where the harmony and contrivance compensate for want of accent, taste, and invention. The Latin motets and hymns, or "Cantiones sacre," which he published jointly with those of his disciple Bird, are perhaps the best of his compositions that have been preserved. These appeared in 1575, under the following title: "Cantiones quæ ab Argumento sacre vocantur quinque et sex Partium. Autoribus Thoma Tallissio et Gulielmo Bardo, Anglis, Serenissimæ Reginæ Majestati à privato facello Generosis et Organistis." At the time of this publication, a very arbitrary and monopolising patent was granted by queen Elizabeth to these composers, for twenty-one years, not only for the publication of their own productions, vocal and instrumental, but those of all other musicians, whether English, French, or Italian, as well as for the sole ruling and vending of music-paper.

Most of these excellent compositions, of which the words were originally Latin, were afterwards adjusted to English words by Dr. Aldrich, and others, for the use of our cathedrals. The canons, inversions, augmentations, diminutions, and other learned and fashionable contrivances of the times, which were of very difficult accomplishment, are carried to a wonderful degree of ingenuity in these productions.

Dr. Thomas Tudway, of Cambridge, made a very valuable collection of English church music, in score, from the Reformation to the Restoration, in six volumes, thick 4to. for Lord Harley, afterwards earl of Oxford, which is now among the Harleian manuscripts, in the British Museum, No. 7337. In the first volume of this collection we have the whole service of Tallis in D minor, in four parts, consisting of the *Te Deum*, *Benedictus*, *Kyrie Eleison*, *Credo*, *Magnificat*, *Nunc Dimittis*, and *Litany*, as printed in 1760, by Dr. Boyce; with several anthems in four and five parts; as, "Wipe away my sins;" "With all our hearts and mouths;" "O Lord, give thy holy spirit;" "I call and cry;" and his anthem, "Discomfit them, O Lord!" erroneously said by Dr. Tudway to have been set for the victory over the Spanish Armada, 1588.

In Christ-Church, Oxford, are manuscript scores of his Præces, Litany, and Anthems, among others by Bird, Farrant, Bull, Gibbons, and Child. Five of his motets and full anthems, in five parts, to Latin and English words, are likewise here preserved among the works of other English masters, in Dr. Aldrich's collection. But the most curious and extraordinary of all his labours was his "Song of forty Parts," which is still subsisting, and now before us. This wonderful effort of harmonical abilities is not divided into choirs of four parts: soprano, altus, tenor, and base, in each, like the compositions *a molti cori*, of Benevoli, and others; but consists of eight trebles, placed under each other;

other; eight mezzo soprani, or mean parts; eight counter-tenors; eight tenors; and eight basses; with one line allotted to the organ. All these several parts, as may be imagined, are not in simple counterpoint, or filled up in mere harmony, without meaning or design, but have each a share in the short subjects of fugue and imitation, which are introduced upon every change of words. The first subject is begun in G, by the first mezzo soprano, or medius, and answered in D, the fifth above, by the first soprano; the second medius in like manner beginning in G, is answered in the octave below by the first tenor, and that by the first counter-tenor in D, the fifth above; then the first bass has the subject in D, the eighth below the counter-tenor; and thus all the forty *real* parts are severally introduced in the course of thirty-nine bars, when the whole vocal phalanx is employed at once, during six bars more. After which a new subject is led off by the lowest bass, and pursued by other parts, severally, for about twenty-four bars, when there is a general chorus of all the parts; and thus this stupendous, though perhaps Gothic, specimen of human labour and intellect, is carried on in alternate flight, pursuit, attack, and choral union to the end; when the *Polyphonic phenomenon* is terminated by twelve bars of universal chorus, in quadragesimal harmony. The entire composition consists of one hundred and thirty-eight bars, in *alla breve* time.

This venerable musician died in November, 1585, and was buried in the old parish church of Greenwich, in Kent. The following epitaph, which Dr. Boyce has printed in the first volume of his Collection of Cathedral Music, Strype, in his Continuation of Stow's Survey, printed 1720, says he found engraved in Gothic letters, on a brass plate in the chancel.

"Entered here doth by a worthy wyght,  
Who for long tyme in musick hore the bell:  
His name to shew was Thomas Tallis hyght,  
In honest vertuous lyff he did excell.  
He serv'd long tyme in chappel with grete prayse  
Fower sovereigntyes reignes, (a thing not often seene);  
I mean king Henry and prince Edward's dayes,  
Queene Marie, and Elizabeth our queene,  
He maryed was, though children he had none,  
And lyv'd in love full three and thirty yeres  
With loyal spowfe, whos name yeleft was Jone,  
Who here entomb'd, him company now hears.  
As he dyd lyve, so also dyd he dy,  
In myld and quyet fort, O happy man!  
To God ful oft for mercy did he cry,  
Wherefore he lyses, let Deth do what he can."

The stone to which this plate was affixed had been renewed by Dr. Aldrich; but the old church having been pulled down, about the year 1720, in order to be rebuilt, no memorial remains of Tallis, or any other illustrious person, who had been interred there anterior to that period.

TALLOW, a sort of animal fat, melted down and clarified. There are scarcely any animals but a sort of tallow may be prepared from; but those which yield the most, and of which the most use is made, are the horse, bullock, sheep, hog, goat, deer, bear, and viper. Some of which tallows, or fats, are used in medicine, and called *axungia*.

Most of the rest are used in the making of soap, and the dressing of leather; but chiefly in making of candles. For this purpose, large quantities are annually imported from Russia in casks. (See CANDLE.) Tallow-chandlers also melt tallow, which is done by chopping the fat, as it is taken from oxen and sheep, and then boiling it for some time in a large copper; and when the tallow is extracted by this

process, the remainder is subjected to the operation of a strong iron press; and the cake that is left, after the tallow is expressed from it, is called a "greave." With this dogs are fed, and most of the ducks that are reared in the vale of Aylebury, and which supply the London markets. It is also sometimes given to oxen and pigs, but certainly without meliorating the flavour of the meat.

It has been observed, that candles should be made without any admixture of oil or grease; and when laid up, should be preserved from the action of the atmosphere. For this purpose, some persons keep their candles closely covered up in bran. If tallows are weak, a part soon becomes converted to an acid by exposure to the air; and this renders the whole, when melted together, unfit for candles. Tallows, also, that contain a large portion of sebaceous acid, require much more barilla than good tallow, in the manufacture of soap, and yet produce a less quantity. Foreign tallows, which frequently contain a large portion of acid, rendering them inferior to the English, may be purified at an insignificant expence by chemical means; and by the proper application of chemical agents, other brown tallows may be rendered beautifully white, and fit for the best purposes. The mode, says a chemical writer of reputation, which naturally presents itself as the best for separating the sebaceous acid from tallow, is that of melting it in water containing some alkali; but old tallows may in general be sufficiently purified from their rancidity by melting them upon lime-water, and giving a considerable agitation to the whole mixture; for when the water is again suffered to subside, it will be found to be offensive in smell, and to have subtracted most of the impurities of the tallow. If the tallow, however, should not be sufficiently purified, a repetition of this process would completely effect it. Parkes's Chemical Essays, vol. i. p. 67, &c.

TALLOW-Tree, in China, is a tree growing in great plenty in that country, which produces a substance like our tallow, and serving for the same purpose. See CROTON *Schiferum*.

All the preparation they give it, is to melt it down and mix a little oil with it, to make it softer, and more pliant. It is true, their candles made of it yield a thicker smoke, and a dimmer light than ours; but those defects are owing, in a great measure, to the wicks, which are not of cotton, but only a little rod or switch of dry light wood, covered with the pith of a rush, wound round it; which being very porous, serves to filtrate the minute parts of the tallow, attracted by the burning stick, which by this means is kept burning.

TALLOW-Chandlers' Greaves, in Agriculture, the refuse of tallow-chandlery, which is found at the bottom of the pan, after the melting of tallow, in a sort of cake, and which is an excellent manure; which see.

TALLOW, in Geography, a post-town of the county of Waterford, Ireland, situated within half a mile of the river Bride, on which there is a village called Tallow-bridge. It was a borough which returned two members, previous to the Union. It is 104 miles S.W. by S. from Dublin, and 4 S. from Lismore.

TALLOW Point, a mark for anchoring in the harbour of Port Royal, in Jamaica.

TALLOWING, in Rural Economy, a term applied to the property or means of forming tallow internally in animals of some kinds, especially those of the sheep and neat cattle sorts. It has been stated in the corrected Agricultural Report of the County of Suffolk, that it is by no means a settled point upon the South Downs of that district, how far a sheep, which gathers its fat upon the intestines, is or is not preferable to another which collects it upon the back and the neck,

neck. The Leicestershire graziers, it is said, contending as much for the latter as the former, is considered as a test of merit in Norfolk, and various other counties. But when it is considered, that it requires a certain portion of food to create a given quantity of fat, the question is, it is thought, which is the best part to collect it upon,—within or without? As long as the fat of the latter will sell at more than one-third of the other, it would seem, it is said, that there cannot be a doubt which of the two is preferable; and that, upon the principle of food eaten to produce the tallow or fat, that which tallows the least is the best breed. The tallow, with the major part of the fifth quarter, is all the butcher's profit, it is said, who would no doubt encourage that breed which tallows best, and yields most offal.

It is noticed, however, that the South Down sheep are not great tallowers, compared with some other sorts; but that what they lose in tallow, they make up in a disposition to fatten. The tallow of a wether, in common management, will, it is said, generally average from an eighth to a tenth part of its dead weight. In a fat wether of Mr. Ellman's, one-seventh part of the dead weight was, it is said, inside fat (caul and loose fat); and that in another which was since killed, one-sixth was inside fat. In others, too, that have been slaughtered, the variation has been found from a seventh to a tenth. The quantity of inside fat depends, it is said, much upon the age and time of fattening. It gathers itself much more in old sheep than in young ones.

The bad ill-formed breeds of sheep, for the most part, tallow in the largest and most favourable manner; and the same is mostly the case in neat-cattle stock, as those which have the best forms and dispositions for fattening have commonly the least property of tallowing well, or afford the least proof, as it is often called.

In regard to the superiority of fat meat, it may be just noticed that, in some great thoroughfares for travelling, the inn-keepers agree with the butchers to give them a penny the pound above the common price for mutton, provided it be very fat. It is likewise the same with beef. This is said to be the case at Petersfield, and to strongly shew that very fat mutton, or meat of any kind, will go much farther than that which is not equally so. It, however, makes against tallowing in animals of these kinds. See *LIVE-Stock* and *SHEEP*.

*TALLWATER*, in *Geography*, a river of Ireland, in the county of Armagh, which runs with the Callen into Blackwater, near Charlemont.

*TALLY*, *TAILE*, or *Taille*, a piece of wood on which retail traders use to score or mark, by notches or incisions, the several quantities of goods they deliver out on credit, to save the trouble of writing down so many little articles in books.

Each score consists of two pieces of wood, or rather of a single piece cleft length-wise, the parts of which falling in with one another, things delivered are scored on both at the same time; the seller keeping one, and the buyer the other.

Tallies are taken as evidences in courts of justice, as much as books. The ancient way of keeping all accounts was by tallies; the debtor keeping one part, and the creditor the other. Hence the *tallier* of the exchequer, now called the *teller*.

There are three kinds of tallies mentioned in our statutes, and long used in the exchequer; *viz.*

*TALLIES of Loans*, one part of which is kept in the exchequer, and the other part given to particular persons, in lieu of an obligation for the monies they have lent to the government on acts of parliament. This last part is called

the *flock*, and the former the *counter-flock*, or the counter-tail.

The tallies are numbered, and bear the person's name, and the sum lent: thus we say, the tallies, N<sup>o</sup> have been paid, or discharged; tallies are risen, fallen, 4, 5, &c.

*TALLIES*, or *Tales of Debt*, are a kind of acquittances for debts paid to the king.

*E. gr.* The university of Cambridge pays yearly 10*l.* for such things as are by charter granted them in fee-farm. He that pays this receives a *taille*, or tally, for his discharge, with which, or a note of it, he repairs to the clerk of the pipe, and there for the tally receives a full discharge on parchment.

*TALLIES of Reward*, or allowance. These are made to sheriffs, for such matters as (to their charge) they have performed in their office, or by such money as is by course cast on them in their accounts, but which they cannot levy.

In the exchequer there is a *tally-court*, where attend the two deputy chamberlains of the exchequer, and the tally-cutter.

*TALLY-Counter*. See *COUNTER*.

*TALLIES, Cutter of the*. See *CUTTER*.

*TALLY, Petty*. See *PETTY*.

*TALLIES, Writer of*. See *WRITER*.

*TALLY the Sheets*, at sea, a word of command, when the sheets of a main-sail or fore-sail are to be hauled aft. See *SHEETS*.

*TALLY for Flowers and Plants*, in *Gardening*, that sort of mark or contrivance, either by pieces of lead or slips of wood, employed for distinguishing them.

The practice of marking flowers, trees, and plants, with tallies of some kind or other, is always highly useful and necessary in regulating their culture, as well as for many other purposes.

*TALLYOOR*, in *Geography*, a town of Hindoostan, in Myfore; 8 miles N.W. of Dindigul.

*TALMAS*, a town of France, in the department of the Somme; 9 miles S. of Dourlens.

*TALMAY*, a town of France, in the department of the Côte d'Or, at the union of the Yonne and the Saône; 18 miles N.E. of Dijon.

*TALMOND*, a sea-port town of France, in the department of the Lower Charente, on the right side of the Gironde, with a harbour; 18 miles S.W. of Saintes.

*TALMONT*, a town of France, in the department of the Vendée; 6 miles E.S.E. of Sables d'Olonne.

*TALMUD*, or *THALMUD*, from תלמוד, *doctrina*, לומד, *he taught*, a Jewish book, which contains a collection of all that relates to the explication of their law.

The Talmud is the body of the Hebrew law; a compilation of expositions of the duties imposed on the people, either in scripture, or by tradition, or by authority of their doctors, or by custom, or even by superstition: to speak more plainly still, it is the course of cases of conscience, or of moral theology, in which the duties are explained, and the doubts cleared, not by reasoning, but generally by authority, by the custom of the nation, and by the decisions of the most approved of the ancient doctors.

The Talmud consists of two general parts, the one called the *Mischna*, the other the *Gemara*; which first part is also frequently called absolutely the "Talmud," the general name of the whole work.

The Jews divide their law into *written*, which is that contained in the books of Moses; and *unwritten*, which is that conveyed by tradition. This latter is, in effect, no other than a gloss or interpretation of the former, given by the ancient rabbins.

The Talmud then contains the traditions of the Jews, their polity, doctrine, and ceremonies, which they observe as religiously as the law of God itself: they would never put them in writing till they were compelled to it by the destruction of Jerusalem, and till they saw themselves dispersed throughout the world.

They had two famous schools; the one at Babylon, and the other at Jerusalem: in these they made two several collections of those traditions; the first at Jerusalem, the other at Babylon; but both called Talmud, both exceedingly revered, especially the Babylonian, though full of extravagancies. This was compiled by the Jews of Mesopotamia, about 500 years after Christ, according to Buxtorf; but Father Morinus offers several reasons to prove that it was not finished till the year 700. The last edition of this Talmud, at Amsterdani, is in twelve folios.

The Talmud of Jerusalem is the least esteemed. It was compiled by the Jews of that city, and particularly by Rabbi Jochanan, rector of the academy at Tiberias, about 300 years after Christ, according to Buxtorf; but Father Morinus, in his "Exercitationes Biblicæ," lib. ii. exerc. 6. judges, from several barbarous terms found in it, of Vandalic or Gothic extraction, that it did not appear till the fifth century. This is published in one large folio.

The Babylonian Talmud consists of two parts: the one the text, the other the gloss or comment: the comment, called the *Gemara*, contains the decision of the Jewish doctors, and their expositions of the text.—This we find stuffed with dreams and chimeras; together with much ignorance, and many impertinent questions and disputations: the style is also very coarse. On the contrary, the text called the *Mischna*, is written in a tolerably pure style, and the reasonings generally much more solid.

The Jews pretend that this was composed by Rabbi Juda, furnished the *Saint*; and that God revealed to him the doctrine, and the chief mysteries of it. But this is only to be understood of the *Mischna*, not of the *Gemara*, the compilation of which was not begun till the sixth century, after the destruction of the second temple.

Rabbi Juda is said to have composed the *Mischna* under the empire of Antoninus, in the second century; but they do not all agree about this antiquity, some carrying it back much farther.

It is the Talmud of Babylon that is usually read, and most frequently consulted, among the Jews; so that when they say simply "the Talmud," they always meant this; never quoting the other without the addition of Jerusalem.

Maimonides has made an abridgment of the Talmud, which Scaliger prefers to the Talmud itself; as being purged of many of the fables of which the other is full. It is a system of the laws and customs of the Jews, both of their civil and their canon law, and the best of their traditions.

About the year 1236, a Jew of Rochelle, well versed in the Hebrew, becoming Christian, made a journey to pope Gregory IX., and discovered to him a number of errors in the Talmud: these the pope sent, in thirty-nine articles, to the archbishops of France, with a letter, appointing them to seize the books of the Jews, and to burn all such as should contain those errors: in consequence of which order, about twenty cart-loads of Hebrew books were burnt. He wrote to the same effect to the kings of England, France, Aragon, Castile, &c.

His successor, Innocent IV., giving commission to his legate, Eudes de Chateauroux, to examine the Talmud, and other Jewish books, more carefully, and to tolerate such errors as were not contrary to the Christian religion; the legate wrote to the pope, that to tolerate them was to ap-

prove them; and the 15th of May, 1248, he also condemn'd them juridically to the flames; and Paul IV. ordered 12,000 volumes of the Talmud to be consumed; and Clement VIII. ordered all the talmudic books that could be found to be destroyed; a zeal worthy of the Papal see! See *MISCHNA*, *GEMARA*, *CARAITES*, and *RABBINISTS*.

**TALO-CHAN**, in *Geography*, a small island near the coast of China. N. lat. 29° 57'. E. long. 122° 4'.

**TALOIRE**, a town of France, in the department of Mont Blanc; 8 miles S.S.E. of Annecy.

**TALON**, in *Ornithology*, the claw of a bird.

**TALON**, in *Architecture*, a kind of moulding, consisting of a cymatium, crowned with a square fillet; frequently found to terminate ornaments of joiners' work, as those of doors, &c.

The word is French, and literally signifies *beel*.

The talon, more properly so called, is a moulding concave at the bottom, and convex at top; having an effect just opposite to the doucine.

When the concave part is at top, it is called an *inverted talon*.

The talon is usually called by our English workmen *ogee*, or *O.G.* and by authors an *upright* or *inverted cymatium*.

**TALOO**, in *Geography*, a harbour on the N. coast of *Eimeo*; which see.

**TALOVKA**, a river of Russia, which unites with the *Analik*, and runs with it into the *Irgis*, 32 miles E. of *Volik*, in the government of *Saratov*.

**TALPA**, the *Mole*, in *Zoology*, a genus of the *Mammalia Feræ*, the characters of which are, that the front teeth in the upper jaw are six and unequal, those in the lower jaw are eight; the canine teeth are one on each side, the upper ones being the largest; and that the grinders are seven in the upper jaw, and six in the lower. *Gmelin* enumerates four species, besides several varieties.

#### Species.

**EUROPÆA**; Common Mole. Has a short tail, and pentadactylous or five-toed feet. The body is thick and cylindrical; the snout slender, but very strong and tendinous; the head not distinguished from the body by any appearance of neck; the legs so extremely short, as scarcely to project perceptibly from the body; the fore-feet situated obliquely outwards, excessively strong and broad, and furnished with very large and stout claws, so as to give the animal the power of working under the surface with the utmost ease and readiness; the hind-feet are small in proportion to the fore-feet, and are calculated for throwing back with ease the mould from behind the creature, during his subterraneous progress; the tail is short and small; the skin is much thicker and tougher in proportion than in other quadrupeds, and the fur with which it is covered equally surpasses that of other animals in sueness and softness. The muscular strength of the mole is very great, and it is enabled to force itself into the ground with an extraordinary degree of celerity. The general length of the mole is about five inches and three quarters, exclusive of the tail, which measures one inch. This animal is supposed to possess the power of hearing in an exquisite degree; and if at any time it emerges from a subterraneous retreat, instantly disappears on the approach of any danger. When first taken, either by digging it out or otherwise, it utters a shrill scream, and prepares for defence by exerting the strength of its claws and teeth. According to the *comte de Buffon*, so lively and reciprocal an attachment subsists between the male and female, that they seem to dread or disrelish all other society.

It has been doubted whether the mole has eyes adapted to vision,

vision, or merely for the purpose of apprizing it of the approach of light, so as to warn it of the danger of exposure. Galen is of the former opinion. Sir Thomas Brown refers this to the class of vulgar errors; but Derham, by dissection, and the aid of a microscope, confirmed the opinion of Galen. This animal is said to feed not only on worms and insects, &c. but on the roots of vegetables: however, it is more carnivorous than frugivorous. In particular circumstances it is very fierce and voracious. Without damp mould for its residence, it is kept alive with difficulty in a state of confinement. Like other animals of a black colour, the mole is sometimes found perfectly white, or cream-coloured, and sometimes spotted. Gmelin reckons four varieties, *viz.* the variegated or spotted mole of Edwards, the white, the yellow, and the cinereous. Of its surprising power in swimming, we have a curious instance recorded in the 3d volume of the Transactions of the Linnæan Society; which is that of a mole that was seen swimming towards a small island in the middle of the loch of Clunie, in Scotland, at the distance of 180 yards from the land. Linnæus and Gmelin affirm that the mole passes the winter in a state of torpidity; but this is contradicted by Buffon, and he alleges facts to prove the contrary. The mole is said to be unknown in Ireland. In Siberia it attains a larger size than in Europe, and its fur is so soft and beautiful, that it would make the most elegant articles of dress, were it not for the difficulty of curing and dressing the skin. See MOLE.

**ASIATICA.** Has no tail, and tridactylous fore-feet. This is the Siberian mole of Pennant. It is somewhat smaller than the common mole, its length being four inches; and is a native of the Cape of Good Hope.

**LÓNGICAUDATA.** With a tail of middling length, and pentadactylous feet, the hinder ones fealy. This is the long-tailed mole of Pennant: its length from nose to tail is four inches and six-tenths; and it is a native of North America.

**RUBRA;** Red Mole of Pennant. Has a short tail, tridactylous fore-feet, and tridactylous hind-feet. This is said to be a native of America.

Dr. Shaw mentions some other species, as the *T. purpurascens*, or black mole, with a gloss of purple, pentadactylous feet, and white tail, first described by Seba, and by him said to be a native of Virginia:—the *T. radiata*, or black mole, with white feet, and nose radiated with papillæ; an inhabitant of North America:—the *Sorex cristatus* of Linnæus; a variety, as Dr. Shaw says, of the *T. longicaudata*:—and the *T. fusca*, or brown mole, with white feet and tail, the fore-feet very broad; a native of North America, and supposed to be the same with the *Sorex aquaticus* of Linnæus.

**TALPA,** (*a mole*;) in *Surgery*, a tumour, which makes its way under the skin, as a mole under the surface of the ground. Such is said to be the derivation of the term. Talpa is often used in the language of surgery, to express an encysted tumour, which forms on the head, and contains a pap-like matter. See ATHEROMA.

**TALPAR,** in *Geography*, a town of Persia, in the province of Irak; 70 miles N.W. of Hamadan.

**TALPARIA,** in *Surgery*, an encysted tumour, filled with a pap-like matter. See TALPA.

**TALPIA,** in *Geography*, a town of Chinese Tartary, in the country of Hami; 28 miles N.E. of Hatamtan.

**TALSENGHE,** a town of Hindoostan, in Visapour; 10 miles S.W. of Visapour.

**TALSHIDE.** See TALWOOD.

**TALSPERG,** a town of France, in the department of the Upper Rhine; 12 miles E. of Porentrui.

**TALTITZ,** a town of Saxony, in the Vogtland; 4 miles S. of Plauen.

**TALUS,** in *Anatomy*, a name formerly given to the astragalus, or that bone of the foot which is articulated to the leg. (See EXTREMITIES.) This bone in the pecora has a cubic shape; and was employed by the ancients in their famous game, ludus talorum. (See Aristotle, Hist. Anim. lib. ii. c. 1.) For the various appellations of this well-known bone in most of the European and Oriental languages, and for its form in different animals; see Th. Hyde, Historia Talorum, in vol. ii. of his Syntagma Differentiationum, Oxon. 1767, 4to.

**TALUS,** or *Talud*, in *Architecture*, the inclination or slope of a work; as of the outside of a wall, when its thickness is diminished by degrees, as it rises in height, to make it the firmer.

**TALUS,** or *Talud*, in *Fortification*.—*Talus of a bastion*, or *rampart*, is the slope or diminution allowed to such a work; whether it be of earth, or stone; the better to support its weight.

The *exterior talus* of a work, is its slope on the side towards the country; which is always made as little as possible, to prevent the enemy's escalade, unless the earth be bad, and then it is absolutely necessary to allow a considerable talus for its parapet, and sometimes to support the earth with a slight wall, called a *revetement*.

The *interior talus* of a work, is its slope on the side towards the place.

This is larger than the former, and has, at the angles of the gorge, and sometimes in the middle of the curtains, ramps or sloping roads for mounting upon the terre-plain of the rampart.

**TALUS,** *Superior*, of the *parapet*, is a slope on the top of the parapet, that allows of the soldiers defending the covert-way with small-shot, which they could not do if it were level.

**TALWOOD,** **TALIATURA**, in our *Old Writers*, firewood cut and cleft into billets of a certain length: it is otherwise written *talghwood* and *talshide*. Stat. 34 & 35 Hen. VIII. c. 3. 7 Edw. VI. c. 7. 43 Eliz. c. 14.

**TALYSIAN**, in *Geography*, a town on the E. coast of the island of Borneo: N. lat. 1° 48'. E. long. 117° 40'.

**TAM,** a river of China, which runs into the Ta; 5 miles S.E. of Khi, in Pe-tehe-li.

**TAM,** *El*, a town of Persia, in Segestan, on the Heermund; 25 miles E. of Zareng.

**TAMA,** a town of Circassia, on the Black sea; 60 miles E.N.E. of Theodosia.

**TAMACH.** See TAINACH.

**TAMACHABAD,** a town of Hindoostan, in Benares; 18 miles W. of Benares.

**TAMACLIPA,** a town of Mexico, in the province of Guasteca; 52 miles N. of Panuco.

**TAMACUIL,** a town of Mexico, in the province of Guasteca; 40 miles S. of Panuco.

**TAMAHOO,** a small island in the Eastern Indian sea, near the west coast of Borneo. N. lat. 0° 7'. E. long. 109° 21'.

**TAMALAMEQUE,** a town of South America, in the province of St. Martha, on the river Magdalena; 160 miles S. of St. Martha. N. lat. 8° 40'. W. long. 73° 56'.

**TAMALAPATRA,** in the *Materia Medica*, a name by which some authors have called the *folium Indicum*, or Indian leaf, used in medicine.

The tree which produces this leaf is the *laurus cassia* of Linnæus,

*Linnaeus*, or *cassia lignea tree*. It is a large and lofty tree, the flowers and fruit of which resemble the cinnamon-tree. Its leaves, when full grown, are ten inches or more in length; and six or eight in breadth. The flowers stand in clusters, in the manner of umbels on the tops of the branches, and are of a greenish-white colour. The fruit is of the bigness of our currant.

The ancients recommended Indian leaf as stomachic, sudorific, and cephalic. At present, it is utterly disregarded, being only kept in the shops as an ingredient in mithridate and theriaca; and is, in its greatest perfection, far inferior to the mace which our college directs as a succedaneum to it. See *CASSIA LIGNEA*.

**TAMALIPAN**, in *Geography*, a chain of mountains in Spanish North America, called by Alcedo, in his description of New Leon, the Grand Sierra, and a branch of which is called the Eastern Tamalipa by Alzate. This last branch extends from the deserts of Jaumape to the eastern coast of the province of Santander, where it is marked in the Spanish chart of the gulf of Mexico by the names of various peaks; while the mountain of Ocasites, visible at sea at the distance of 160 miles inland, must nearly equal Orizava in height, and appears to belong to the same branch of the grand ridge of Tamalipa.

**TAMALMA**, a town of Africa, in the country of Kavar; 120 miles N. of Kanem.

**TAMAMES**, a town of Spain, in the province of Leon; 15 miles E. of Ciudad Rodrigo.

**TAMAN**, an island at the mouth of the Kuban, and a principality belonging to it, and also a town on the same island, called *Phanagoria*, (which see.) This principality was anciently occupied by the Chazares; but it was wrested from them in the year 965 by the Russian combined with the Byzantine Greeks, who made themselves masters of the countries bordering on the sea of Azof in 1015, and completely overturned the Chazarian state, creating a distinct principality on the isle of Taman, to which both the Chazares and the Zichians were for a long time tributary. See **TUMTARAKAN**.

Towards the end of the 11th century, while Russia was torn by intestine broils, the principality of Taman was lost to that empire. At length, in 1221, the Mongoles made their first attack. The Komanes were expelled or subdued, but the Ziches fought for their liberty, and could not be made to submit till the year 1277, when they were overpowered by Margu-Timur-Khan and the famous Nogay. Nevertheless, they retained some degree of independence in their woody and mountainous regions. The Ottomans indeed, in 1484, conquered the cities and forts of Taman, Temryuk, and Atschuk; but they gained no sovereignty over the Tscherkassians or Circassians. At the peace of 1774, the sultan of the Ottomans relinquished his possessions in these parts; but, contrary to treaty, held Taman and Temryuk in a state of siege, till the Crimean khan, by the aid of the Russians, drove the Ottoman garrison out of them. By the treaty of the year 1783, Russia obtained, together with the Crimea and the Eastern Nogay, the northern part of the Kuban as far as the promontory of Caucassus.

The Zichians or Tschekians, called by the Russians Yafi, are the principal inhabitants of the isle of Taman. They formerly paid a small tribute to the Crimean khan, but in all other respects are governed by their own beys. The isle Atschuk or Atschuyef is likewise inhabited by Zichians. These two tribes, which, properly speaking, are only one collateral branch of the Tscherkassians, have be-

longed to the Russian empire, as inhabitants of the Kuban, since the year 1783.

**TAMAN**, the strait or channel that forms a communication between the Black sea and the sea of Azof.

**TAMANAH**, a sea-port town of Hindoostan, on the coast of Malabar, in the country of Concan; 25 miles S. of Gheriah. N. lat. 16° 30'. E. long. 73° 15'.

**TAMANDUA**, in *Zoology*, a creature called in English the ant-bear; and by the Brazilians *tamanduaguacu*; and the *tamanoir* of Buffon; different species of the same genus. See **MYRMECOPHAGA**.

**TAMAR**, in *Geography*, a considerable river, which originates in the county of Cornwall, England, and separates that county, except for the space of a few miles, from Devonshire. It rises in a moor in the parish of Morwinstow, about three miles from the North sea: passing near Whitstone, about ten miles from its source, it reaches Tamerton, which takes its name from this river; here it receives the waters of the Werrington, and about a mile and a half further its current is increased by the Attery, which runs under the walls of the town of Launceston: at Poulston-bridge it is a wide and rapid stream; a mile below Graiston-bridge it is joined by the Inney, which, rising in Alternon, passes through the parishes of Lewanick and Lezant. In the parish of Stoke-Climfand, the Tamar has a high, strong, stone bridge, called by Leland "Hawtebrig," or the High bridge, now commonly Horse-bridge. The last or lowest bridge on this river is in the parish of Calstock, and was begun, according to Leland, by sir Piers Edgcombe. Five miles farther the Tamar receives the Tavy from the east, and having made a creek into the parishes of Botesfleming and Landulph on the west, becomes a spacious harbour; and after passing near the ancient borough of Saltash, is joined by the Lynher creek and river. Increasing in importance as it winds along, it next forms, between Dock and Saltash, the noble basin called the "Hamoaze," or Plymouth Harbour, where a large proportion of the British navy rides in complete security. Having made two large creeks, one called St. John's, the other Millbrook, on the west, and Stonehouse creek on the east, the Tamar, after a course of about 40 miles nearly south, falls into the sea, having mount Edgcombe for its western, and the lands of Stonehouse and St. Nicholas island for its eastern boundary, and produces the noble road for shipping named Plymouth Sound. The Tamar is one of the most considerable rivers in the west of England; its banks are richly diversified with rocks, woods, and meadows; and the scenery in various parts of its course is extremely interesting and beautiful. The views about the Cater-marther rocks, Tavistock-New-bridge, the Morwell rocks, Cotele and Pentilly, are peculiarly romantic, and can scarcely be equalled by any other river in the western part of the kingdom. (See **PLYMOUTH HARBOUR**.) Lysons's *Magna Britannia*, vol. iii. Cornwall. Beauties of England and Wales, vol. ii. Cornwall. By J. Britton and E.W. Brayley.

**TAMAR**, a town of Arabia, in the province of Hedsjas; 40 miles N.N.W. of Karac.

**TAMAR Bay**, a harbour in the straits of Magellan, E. of Cape Tamar.

**TAMARA**, in *Ancient Geography*, a river of Spain, which rose in the mountains W. of Lucus Augusto, and discharged itself into the sea to the W. of a small gulf, on the banks of which were Grandinurum and Aera Sestianæ. Mela calls this river Tanaris. The Tamarisci inhabited its banks.

**TAMARA**, a town of the isle of Albion, assigned by Ptolemy

lemy to the Damnonii or Dumnonii. Mr. Horsley thinks it was Saltash; but Mr. Camden and Mr. Baxter suppose it, more probably, to be Tamerton, which still retains its ancient name.

TAMARA, in *Geography*, a town of Morocco, on the coast of the Atlantic; 30 miles W. of Tarudant.—Also, a sea-port town on the N.W. coast of the island of Socotora, and residence of the king.

TAMARA *Istles*, or *Istlands of Idols*, a cluster of islands near the coast of Sierra Leone. N. lat. 8° 40'.

TAMARA', in *Botany*, the Hindoo name of a very celebrated plant. (See our article CYAMUS, written by the late Rev. Mr. Wood.) The above name should seem to originate from the Hebrew תמר, *Tamar*, a Palm-tree, whence dates are called Támara by the Spaniards; and it may allude to the form of the seeds of the *Cyamus*, resembling dates; or to their similar use as an oriental article of food. *Támar* is also the Arabic name of the same fruit. See TAMARINDUS.

TAMARACA, TAMARICA, or *Itamaraca*, in *Geography*, a district of Brasil, in the jurisdiction of Fernambuco. It has its name from an island on the coast, near the mouth of the river Tamaraca, which constitutes the principal part of its district, though the territory thereof extends inland between 30 and 40 leagues, having Parayba on the north, Fernambuco on the south, the ocean on the east, and unfubbed Indians on the west. It was reckoned one of the most ancient and flourishing captainships in Brasil; but Parayba and Fernambuco have since exceeded it. The island is parted from the main land by a very narrow channel. It is fertile and pleasant enough; producing large quantities of Brasil wood, cotton, cocoa-nuts, sugar, melons, citrons, &c. besides a good deal of timber for fuel and other purposes. It is about nine miles in length, and three in breadth, and about 22 in circuit. It has a commodious haven on the south side, with some good springs and rivulets of fresh water. The entrance into the port is by a channel of between 15 and 16 feet water, commanded by a castle, built on an eminence, and formerly taken by the Dutch: who also built Fort Orange at the mouth of the channel, which was inaccessible, by reason of the marshes surrounding it; so that the vessels that sailed down from the island were exposed to it, and they had in some measure stopped all the avenues from the Portuguese. This island, and the territory on the continent belonging to it, pay 3000 ducats to the governor of the captainship, and in it are reckoned to be about 22 sugar-mills. The French had formerly a canton or settlement on this coast, still called from them "Porto dos Francezes;" but the Portuguese obliged them to evacuate it. The capital, called "Nostra Senhora de Conceizao," or "Da Tamaraca," stands at the entrance into the river of the latter name; and near it is a small castle with a redoubt, commanding the avenues; and about four miles N. of the mouth of the river is the famous point denominated "Punta Pedro."

TAMARACA, a river of Brasil, which runs into the Atlantic, S. lat. 7° 52'.

TAMARIL, a town of Spain, in Catalonia, situated about a mile from the sea-coast; 2 miles N.E. of Tarragona.

TAMARINDUS, in *Botany*, the Tamarind-tree, is so called from *Tamar*, which is Hebrew for a Palm-tree, (and likewise the Arabic appellation of its fruit, the Date,) combined with the Latin word *Indus*, Indian. The form of the pod, and its use as an article of food, may well have given rise to the name. (See TAMARA'.)—Linn. Gen. 23. Schreb. 450. Willd. Sp. Pl. v. 3. 577. Mart. Mill.

Dict. v. 4. Ait. Hort. Kew. v. 4. 134. Juss. 347. Lamarck Illustr. t. 25. Gært. t. 146.—Class and order, *Triandria Monogynia*, Linn. *Monadelphia Triandria*, Schreb. Willd. Nat. Ord. *Lomentaceæ*, Linn. *Leguminosæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf: tube turbinate, compressed, tapering at the base, oblique at the mouth, permanent; limb in four deep, ovate, acute, flat-tish, reflexed, coloured, deciduous segments; the upper and lower ones rather the broadest. *Cor.* Petals three, ovate, acute, concave, crenate, wavy, reflexed, the length of the calyx, inserted into the mouth of the tube; the two lateral ones rather the largest. *Stam.* Filaments three, inserted into the mouth of the calyx in the vacancy opposite to the uppermost petal, awl-shaped, as long as the corolla, connected in their lower half, curved upwards; anthers ovate, large, incumbent. There are besides seven rudiments of stamens; five of them setaceous threads, capitate, very short, alternate with the above, connected in their lower part, two lower than the rest; and two minute bristles, proceeding from the calyx beneath the filaments, and lying upon them. *Pist.* Germen oblong, compressed, incurved, seated on a stalk, which springs from the bottom of the calyx, and is attached longitudinally to the back of its tube within, the projecting part downy along its upper edge; style awl-shaped, ascending, downy at its lower edge, rather longer than the stamens; stigma tumid, obtuse. *Peric.* Legume oblong, compressed, obtuse, with a point, swelling at the seeds, of one cell, not bursting; its coat double; the outer dry and brittle; inner membranous; a quantity of soft pulp being lodged between the two. *Seeds* few, orbicular, somewhat angular, flattened, hard, polished, with a central circumscribed disk at each side.

Ess. Ch. Calyx in four deep segments. Petals three. Barren filaments seven. Style one. Legume pulpy within.

1. *T. indica*. Tamarind-tree. Linn. Sp. Pl. 48. Willd. n. 1. Ait. n. 1. Jacq. Amer. 10. t. 10. and t. 179. f. 98. Woodv. Med. Bot. t. 166. (Tamarindus; Rumph. Amboin. v. 2. 90. t. 23. Ger. Em. 1607. Balam-pulli; Rheede Hort. Malab. v. 1. 39. t. 23.)—This tree, a native of Egypt, Arabia, and the East Indies, is generally preferred, rather than cultivated, in both Indies for the sake, both of its shade, and its acid, cooling, and highly grateful, as well as salutary, fruit; the pulp of which, mixed with boiled sugar, is frequently imported into Europe, and highly esteemed. The *trunk* is lofty, and of considerable thickness, crowned with wide-extended *branches*, bearing umbrageous tufts of alternate, abruptly pinnate, smooth, bright-green *leaves*, each composed of many pair of elliptic-oblong, sessile, entire *leaflets*, rather glaucous beneath. *Flowers* in simple clusters, terminating the short lateral branches. *Petals* yellow, elegantly veined with red. *Fruit* pendulous, like large beans. Gærtner observes that the West Indian Tamarind pod is shorter than what Rheede and Rumphius represent, and has fewer seeds. Hence he distinguishes two species, which appear from history as well as observation to be mere varieties, the plant being more at home in the eastern than in the western side of the globe, though almost perfectly naturalized in the latter. It is often seen in our stoves, but seldom in blossom.—As Dr. Woodville has given an original coloured plate of this interesting plant, drawn by Mr. Sowerby from a specimen that flowered in Kew garden, and the only one of authority extant; we conceive his work, in this instance, if not in every other, might have been cited with advantage, by our friend Mr. Aiton, in the *Hortus Kewensis*.

TAMARINDUS, in *Gardening*, contains a plant of the exotic tree kind, of which the species is the tamarind-tree (*T. indica*);

dica); which grows to a very large size in the countries where it is a native: the stem being very large, and covered with a brown bark, dividing into many branches at the top, which spread wide every way; the flowers come out from the side of the branches, five, six, or more together, in loose bunches; the pods being thick and compressed; those from the West Indies from two to five inches in length, containing two, three, or four seeds; but those from the East Indies are almost twice as long, and contain five, six, and even seven seeds. The tree is a native of both the Indies, and of some other places.

*Method of Culture.*—This is a plant which is increased from seeds, which should be sown in the spring on a hot-bed, and when the plants are come up, each planted in a separate small pot, filled with light rich earth, plunging them into a hot-bed of tanners' bark to bring them forward, watering and shading them until they have taken root; and as the earth in the pots becomes dry, they must be watered from time to time, and have air given in proportion to the warmth of the season, and the bed in which they are placed. When the pots in which they are planted are filled with their roots, the plants should be shifted into pots of a larger size, which must be filled up with rich light earth, and again plunged into the hot-bed, giving them air as before, according to the warmth of the season; but in very hot weather, the glasses should be shaded with mats in the heat of the day, otherwise the sun will be too violent for them through the glasses; nor will the plants thrive if they are exposed to the open air, even in the warmest season; so that they must be constantly kept in the bark-stove both summer and winter, treating them in the same manner as the coffee-tree. These plants have a good effect in the stove collections.

It is the seed-pods of this tree which form and constitute the preserve called tamarinds, which is sold in the shops; and is of such a pulpy acid quality, as to be of great use in abating and quenching thirst, and in cooling and allaying excessive heat. It is brought hither from both the East and West Indies; but though the pods of the trees of the former situation are much finer and larger, the preserve from the latter is generally considered better, and of course mostly preferred.

There is nothing peculiar in the making of this sort of preserve, exactly the same methods being followed as are common in the preserving of other substances of similar kinds.

*TAMARINDUS*, in the *Materia Medica*. The East India tamarinds are longer than those of the West; the former containing six or seven seeds each, the latter rarely above three or four; nevertheless they seem to be the produce of the same plant: the Oriental sort is drier and darker-coloured than the Occidental, and has more pulp; the former is sometimes preserved without addition, but the latter has always an admixture of sugar.

In the West Indies, the pods are gathered in June, July, and August, when fully ripe; and the fruit, freed from the shelly fragments, is placed in layers in a cask, and boiling syrup poured over it till the cask is filled. When cool, the cask is headed for sale. When tamarinds are good, they are not in any degree musty; the seeds are hard, flat, and clean; the strings rough and entire, and a clean knife thrust into them does not receive any coating of copper. They should be preserved in closely covered jars.

We owe the knowledge of the use of tamarinds, in medicine, to the Arabians. The ancient Greeks knew nothing of them; and Serapion, Mesue, and Avicenna, are the first authors who prescribe them.

The fruit of the tamarind, which is what we use, is only

the pistil of the flower swelled into a pod; this is greenish at first, but grows brownish or reddish as it ripens; its common size is four inches in length, and one in breadth; and it is undulated on the back, and deeply notched in three or four places at the front, which is terminated by a large rib, that runs from the pedicle on which it grows, to the end of the pod, and there frequently terminates in a sort of hook.

This fruit is, properly speaking, composed of two pods, the one inclosed within the other: the outer pod is fleshy, and of the twelfth of an inch in thickness when fresh, and the inner one is as thin as a fine piece of parchment: between these two there is an intermediate space of about a quarter of an inch all the way; and this space is filled up with a very soft and pulpy substance, of a tart but very agreeable taste, which is what we use in medicine. This is blackish, and of a viscous texture, and is traversed by three large vessels, or rather bundles of vessels, one of which runs all along the back of the pod, and the two others are placed on the opposite side, and often there are several ramifications of vessels, which run off different ways from these. These vessels carry the vinous juice, which afterwards hardens into the viscous matter of the pulp; but this is not all their office, for they also convey nourishment to the seeds in the inner pod.

We use the tamarinds only in medicine; but the Africans, and the people of many of the Oriental nations, where they are common, make them into a sort of confection with sugar, which they eat as a delicacy, and which cools them in the violent heats of their climates; and at the same time keeps their bowels in a proper state of laxity. The four taste of this fruit proves, that acid particles abound greatly in it; and a chemical analysis of it gives further proof of this.

According to the analysis of Vauquelin, the pulp contains, independently of the sugar with which it is mixed, super-tartrate of potash, gum, jelly, citric acid, tartaric acid, malic acid, and a feculent matter. The acid taste chiefly depends on the citric acid, as its quantity exceeds that of the others  $3xvj$  of the prepared pulp, containing  $3iss$  of citric acid, but only  $3ij$  of tartaric acid,  $3fs$  of super-tartrate of potash, and  $3fs$  of malic acid. *Annales de Chimie*, vol. v. p. 92.

The essential salt of tamarinds, as Beaumé observes, may be obtained more expeditiously, by clarifying the decoction of the tamarinds with whites of eggs, than by filtering and evaporating it to a proper consistence, and setting it to cool: the salt shoots into crystals of a brown colour, and very acid taste, but in dissolving and crystallizing them again, or barely washing them with water, they lose almost all their acidity; the acid principle of the tamarind seeming not to be truly crystallizable.

The pulp of tamarinds is an agreeable laxative acid, of common use in inflammatory and putrid disorders, for abating thirst and heat, correcting putrefaction, and loosening the belly. The dose, as a laxative, is two or three drachms; an ounce or two prove moderately cathartic. It is an useful addition with this intention to the purgative sweets, cassia and manna, in increasing their action, and rendering them less liable to produce flatulencies; the resinous cathartics are said to be somewhat weakened by it. Lewis.

This pulp is an ingredient in *confectio cassiæ*, *confectio sennæ*, and in the *infusum tamarindi cum senna*.

*TAMARISCUS*, in *Botany*. See *TAMARIX*.

*TAMARISK PLANT*, in *Agriculture*, is a plant of the large shrubby kind, which has lately, it is said, been employed in some southern situations which are much exposed to the sea air, and other effects of it, with great utility. It is capable of being readily raised and propagated by means of cuttings of the last year's growth, as they take root with-

out any difficulty, and are, of course, admirably adapted as plants for forming hedges. It is the French fort that is made up of in this way. See *QUICKSET-Hedge*.

TAMARITE, in *Geography*, a town of Spain, in Aragon; 16 miles E.S.E. of Balbastro.

TAMARIX, in *Botany*, *Tamariscus* of Tournefort, and of some, but not all, of the older botanists, is supposed to derive its name from the Tamarisci, a people who inhabited a country on the other side of the Pyrenées, where the most common species of this genus abounds. Such at least is the opinion of De Theis. Martyn says, some deduce this word from the Hebrew *Tamaris*, to wipe or cleanse; but we feel no great satisfaction in either of these etymologies.—Linn. Gen. 148. Schreb. 200. Willd. Sp. Pl. v. 1. 1498. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 338. Prodr. Fl. Græc. Sibth. v. 1. 208. Ait. Hort. Kew. v. 2. 171. Juff. 313. Lamarck Illustr. t. 213. Gært. t. 61.—Class and order, *Pentandria Trigynia*. Nat. Ord. *Succulentæ*, Linn. *Portulacæ*, Juff.

Gen. Ch. Cal. Perianth inferior, in five deep, obtuse, erect, permanent segments, half the length of the corolla. Cor. Petals five, ovate, obtuse, concave, spreading. Stam. Filaments five at least, capillary; anthers roundish. Pist. Germen pointed; style none; stigmas three, oblong, feathery, revolute. Peric. Capsule oblong, pointed, triangular, longer than the calyx, of one cell and three valves. Seeds numerous, minute, each with a stalked feathery crown.

Obs. *T. germanica* has ten stamens, five of which, alternate with the others, are external and shorter; all are connected at the base. Linn.

Ess. Ch. Calyx inferior, in five deep segments. Petals five. Capsule of one cell and three valves. Seeds with a feathery crown.

1. *T. gallica*. French Tamarisk. Linn. Sp. Pl. 386. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1318. Sm. Fl. Græc. Sibth. t. 291. unpublished. Mill. Ic. t. 262. f. 1. (*Tamariscus carbonensis*; Ger. Ein. 1378. Lob. Ic. v. 2. 218. Myrica; Camer. Epit. 74. f. 1.)—Stamens five. Clusters lateral. Branches smooth. Leaves lanceolate, imbricated, spurred at the base.—Native of rocks and banks, or of swampy ground, especially towards the sea, in the south of Europe, and north of Africa, very abundantly. It is plentiful about the coasts of Cornwall, Hampshire, and Sussex, undoubtedly wild. This shrub appears to have been common in the English gardens, as it still is, in Gerarde's time; and yet Camden, in his life of queen Elizabeth, attributes to archbishop Grindall, who died in 1583, its being first brought into England, and made known as "exceeding good to ease the hard distemper of the spleen." (See our 7th species.) Mr. Hudson has not admitted any of this genus into his *Flora*. Dr. Sibthorp found this plant common in rather moist situations in Greece, nor can there be any doubt that it is the *μαρινον* of Dioscorides. The Turks call it *Il Ghin*. On the eastern coast of Italy we have observed it to be the favourite food of sheep, probably on account of a saltish flavour, perceptible to our taste. This is an elegant, drooping, slender-branched shrub, with smooth and shining twigs, of a mahogany red. Leaves minute, rather fleshy, lanceolate, acute, smooth, deciduous, with a posterior spur, as in some species of *Sedum*; imbricated on the youngest shoots; scattered on the older twigs. The flowers appear in July, in copious, long, cylindrical clusters, rather than spikes, at the sides of the last year's shoots. Bractæas awl-shaped, solitary, at the base of each smooth and naked partial stalk. Calyx bell-shaped, acute, smooth. Corolla and stamens white or rose-coloured.

Willdenow's variety  $\beta$  we shall next describe as a distinct

species; his  $\gamma$ , the *T. africana* of Poirer, gathered by this traveller in Barbary, is said to have peculiarly short, thick and dense spikes, but we are not furnished with any further information on the subject.

2. *T. tomentosa*. Downy-branched Tamarisk. (*T. gallica*  $\beta$ ; Willd. n. 2. *T. pentandra* varietas; Pall. Rofs. v. 1. p. 2. 72. t. 79. BCD.)—Stamens five. Clusters lateral. Leaves imbricated, awl-shaped, elongated, hoary and downy as well as the branches.—Found by Pallas in salt sandy deserts about the Caspian sea. He speaks of this plant as a singular very elegant variety of the preceding, about six feet high, with all its branches downy and hoary; the younger ones thicker than in the common *T. gallica*, (which he chooses to call *pentandra*), and the leaves longer, hoary, densely imbricated; all the parts being thicker and more crowded. In the clusters and flowers he observed no difference. Willdenow's suggestion, of this being probably a distinct species, is apparently well-founded.

3. *T. articulata*. Jointed-branched Tamarisk. Vahl Symb. v. 2. 48. t. 32. (T. orientalis; Forsk. Ægypt.-Arab. 206. Thuja aphylla; Linn. Sp. Pl. 1422, excluding the synonym of Shaw.)—Stamens five. Spikes lateral. Branches jointed. Leaves sheathing, abrupt, with a short spreading point.—Gathered by Forskall in Arabia. The original specimen, erroneously considered by Linnæus, for want of fructification, as a *Thuja*, appears to have been brought from Egypt, or the Levant, by Hasselquist. The plant of Shaw is *Thuja articulata*, which will hereafter be described under its proper genus. We find no certain evidence of the *Tamarix* before us being a native, as Vahl says, of the East Indies, and we imagine he confounded with it our next species. The true plant of Hasselquist and Vahl has copious slender branches, appearing when young as if jointed, each joint being crowned with a minute dotted scale-like leaf, whose annular base encircles the branch, and whose short, erect, keeled, acute point projects on one side. These leaves are permanent, enlarged, and membranous on the older branches. The flowers are described by Vahl as forming lateral spikes about the ends of the branches, each flower being sessile, accompanied by a bractea resembling the leaves, but with a widely-spreading point. Segments of the calyx roundish and obtuse. Petals the size of *T. gallica*, linear, or rather elliptical. Stamens five. Capsule with four angles, pyramidal.

4. *T. epacroides*. East Indian Tamarisk.—Stamens five. Clusters lateral and terminal. Leaves ovate, acute imbricated, clasping the stem; gibbous at the base. Bractæas awl-shaped, longer than the flowers.—Found by Kœnig growing plentifully on the banks of a river in the East Indies, which he calls *flumen Collorem maximum*. We have the same from Rottler and Roxburgh. This is unquestionably distinct from the preceding, and hitherto undescribed. The young branches have no jointed appearance, nor do the leaves surround them with an annular permanent base. The latter are succulent, of a broad triangular shape, tapering into an inflexed point; the floral ones, or bractæas, much narrower, coloured, strongly keeled. Flowers very small, on short partial stalks. Segments of the calyx broad and obtuse, fringed. Petals elliptical. Capsule scarcely above a line in length, prismatic, accompanied by the permanent filaments, which are generally rather longer. Whether the *T. chinensis* of Loureiro be this plant, his description is not sufficient to determine. He says the petals are linear.

5. *T. mucronata*. Pointed Tamarisk.—Stamens eight or ten. Spikes lateral and terminal. Leaves sheathing, abrupt, pointed. Bractæas taper-pointed, lanceolate.—The specimens of this very distinct species, in the Linnæan herbarium,

have

have no mark by which we can ascertain its native country, though we suspect them to have been sent from the East Indies. The jointed appearance of the young *branches*, and the sheathing abrupt form of the *leaves*, approach those of *T. articulata*; but the *leaves* have much more elongated and tapering points, and every part is twice the size of that species. The *foliage* moreover is much less evidently dotted. *Flowers* large, sessile, with lanceolate, membranous-edged *bracteas*, whose points are longer than the calyx, and very slender. Segments of the *calyx* elliptical, obtuse, flat. *Petals* obovate. *Stamens* eight or ten, we cannot be certain which is their general number. *Capsules* prismatic, glaucous, three-quarters of an inch long. *Seed-down* long and feathery.

6. *T. songarica*. Songarian Tamarisk. "Pallas Nov. Act. Petrop. v. 10. 374. t. 10. f. 4." Willd. n. 3.—"Stamens eight or ten. Flowers axillary, somewhat spiked. Leaves fleshy, obtuse, triangular."—Gathered by Pallas, in a salt soil, on the banks of the Songari. We know nothing of this species but from Willdenow. The "triangular blunt leaves" indicate an essential difference from the last.

7. *T. germanica*. German Tamarisk. Linn. Sp. Pl. 387. Willd. n. 4. Ait. n. 2. Fl. Dan. t. 234. Mill. Ic. t. 262. f. 2. Pall. Rofs. v. 1. p. 2. 73. t. 80. (*Tamariscus germanica*; Ger. Em. 1378. Lob. Ic. 218. Myrica; Camer. Epit. 74. f. 2.)—Stamens ten, monadelphous. Clusters terminal. Leaves linear-lanceolate, sessile, obtuse.—Native of swamps in Germany, Siberia, Switzerland, and the mountains of Dauria and Caucasus. Common in our gardens, where it flowers in the open air from June to September. Mr. Aiton says, on Hakluyt's authority, that this was the species introduced by archbishop Grindall; see *T. gallica*. Gerarde speaks of both as prospering well in the English gardens. The present is a more upright and glaucous *shrub* than the *gallica*, as well as larger in all its parts. *Leaves* sessile, imbricated, channelled, dotted, entirely pointless, not dilated at the base. *Bracteas* ovate, pointed, with membranous edges. Segments of the *calyx* ovato-lanceolate, likewise membranous at the sides. *Petals* obovate, flesh-coloured, not much longer than the calyx. *Capsule* glaucous, the size and shape of our *T. mucronata*. *Seed-down* long and finely feathery.

Pallas figures what he conceives to be an annual herbaceous variety of this species, of which, not having seen it, we do not feel ourselves competent to give an opinion.

TAMARIX, in *Gardening*, furnishes plants of the hardy, deciduous, tree and shrub kinds, of which the species that are cultivated are, the French tamarisk (*T. gallica*); and the German tamarisk (*T. germanica*).

Though the first in its native situation grows to a tree of middling size, in this climate it seldom rises more than fourteen or sixteen feet high, sending out many slender branches, most of which spread out flat, and hang downward at their ends, being rather of a shrubby nature. It is prevalent in the south of France, and in other southern countries.

But the second species is rather a shrub than a tree, having several woody stalks arising from the same root, which grow quite erect, sending out many side branches, which are also erect. It is found in many parts of Germany, &c.

*Method of Culture*.—All these plants may be increased either by laying down their tender shoots in autumn, or by planting cuttings in an east border, which will take root in a short time, if they are supplied with water in the spring, before they begin to shoot in dry weather; but they should not be removed until the following autumn, at which time they may be either placed in a nursery, to be trained up two or three years, or where they are designed to remain, mulch-

ing their roots, and watering them according as the season requires, until they have taken root; after which, the only culture they will require is to prune off the straggling shoots, and keep the ground clear about them.

The layer method is not only tedious, but unnecessary, as the cuttings grow readily, and the layers often will not strike at all. The cuttings should be of the last summer's shoots, and a moist border is most proper for them. In two years they will be good plants for the shrubbery, and may be planted out in almost any soil, though they like a light, moist earth best, especially the latter sort, which grows naturally in low watery situations.

Both these plants are of a rather hardy nature, and beautiful in their foliage and fine spikes of flowers. They will succeed in almost any sort of soil and situation.

They are very ornamental in the shrubbery borders, clumps, and other parts of grounds.

The former sort has likewise been lately recommended as a beneficial plant for forming quick or living hedges with, in such situations as are exposed much to the sea-air and blasts, as it has been found to stand such exposures remarkably well, where not affected by the winter frosts, of which it is rather impatient. See *QUICK Hedges*, and *TAMARISK-Plant*.

TAMARUS, in *Ancient Geography*, a river of the isle of Albion, which still retains its ancient name, being called Tamar, from Tamara, a gentle river; and its mouth is Plymouth haven.

TAMASA, or TAMASI, in *Hindoo Mythology*, is a name given to the goddess Parvati, in her black character; the word meaning blackness or darkness. The name of Tamas, or Tamasa, was given to a dark, gloomy, astronomical character, called *Rabu*, (see that article,) and Ketu, the names severally of the dragon's head and tail, or the ascending and descending nodes of astrologers. One of the sons of Pavaka, the Hindoo fire-king, is likewise named Tamasa. (See PAVAKA.) Also one of those mythological, or historical personages, called Menus, of whom see under MENU. In the Sanscrit tongue, the root *tam* is prolific of derivations indicating properties of a dark, or gloomy, or malignant tendency.

TAMASA, in *Geography*, a river of Asia, in Mingrelia, which discharges itself into the Black sea.

TAMASIDAVA, in *Ancient Geography*, a town situated in the interior of Lower Mæsia, at some distance from the river Hierafus.

TAMASQUI, in *Geography*, a town of Mexico, in the province of Guafteca; 36 miles W.S.W. of St. Yago de los Valles.

TAMASSUS, in *Ancient Geography*, a town situated in the interior of the isle of Cyprus, W. of Ledra, on one of the streams which formed the Pedæus.

TAMATAMQUE, or *Villa de las Palmas*, in *Geography*, a town of South America, in the kingdom of Granada, on the river St. Martha; 25 miles S. of Teneriffe.

TAMATIA, in *Ornithology*, the name of a very strange bird of the Brasils. It is a species of *Bucco* in the Linnæan system by Gmelin, and the spotted-bellied barbut of Latham.

Its head is very large; its eyes large and black; its beak is two fingers breadth long, and one broad, shaped somewhat like a duck's, but pointed at the end; its upper chap is black, its under one yellow; its legs are long, and the thighs in great part naked; its toes are long; its tail is very short; its head is black, and its back and wings of a plain dusky brown; its belly is of the same brown, variegated with white.

TAMATMA,

**TAMATMA**, in *Geography*, a town of Africa, in the kingdom of Bornou.

**TAMBA**, a town of Africa, in the kingdom of Benguela; 165 miles E. of Benguela.—Also, a town of Hindoostan, in Vissapour; 20 miles S.W. of Sattarah.

**TAMBA-AWRA**, or **TAMBAOURA**, a town of Africa, in the kingdom of Bamboouk, having in its vicinity a gold-mine; 108 miles S.E. of Gallam. N. lat.  $13^{\circ} 20'$ . W. long.  $9^{\circ} 25'$ .

**TAMBAC**, or **TAMBAQUA**, a mixture of gold and copper, which the people of Siam hold more beautiful, and set a greater value on, than gold itself.

Some travellers speak of it as a metal found in its peculiar mines; but upon what authority we do not know.

The abbé de Choisy, in his *Journal of Siam*, doubts whether this may not be the *electrum*, or amber of Solomon.

The ambassadors of Siam brought several works in tambac to Paris in the reign of Lewis XIV., but they were not found so beautiful as was expected. See **TOMBAC** and **GOLD-coloured Metal**.

**TAMBACH**, in *Geography*, a town of Germany, in the principality of Gotha; 6 miles N.E. of Smalkalden.

**TAMBACUNDA**, a town of Africa, in the country of Woolly; 30 miles E.N.E. of Medina.—Also, a town of Africa, in the country of Neola; 52 miles W. of Baniferile.

**TAMBERCHERRY**, a town of Hindoostan; 18 miles N.E. of Calicut.

**TAMBILLO**, a town of Peru; 56 miles N. of Oruro.

**TAMBO**, a town of South America, in the province of Popayan; 12 miles W. of Popayan.—Also, a town of Paraguay; 250 miles E. of Assumption.

**TAMBO de Oeros**, a town of Peru, in the diocese of Cusco; 136 miles W.N.W. of Cusco.

**TAMBONA**, a town of Hindoostan, in the country of Travancore; 40 miles N.E. of Travancore.

**TAMBOOKIES**, a people of the colony of the Cape of Good Hope, situated N.E. of the Kouffis, or the Kooffis, N. to the Orange river and tropic of Capricorn, are supposed by Mr. Barrow to be of Arabian extract, as they widely differ from the Hottentots and the Negroes, and are acquainted with the smelting of iron, and some other rude arts. He conceives that a belt of this race spreads across to the Atlantic. The Demaras on the Copper mountains are Kouffis; and their country is so barren and sandy, that they cannot keep cattle. The Orange river, called the Groot or Great river, seems to rise about S. lat.  $30^{\circ}$ . E. long.  $28^{\circ}$ , and passes W. by N. till it falls into the sea between the Great and Little Nemakos. It has high cataracts and inundations like the Nile. On the shores are carnolians, calcedonies, agates, and variolites. See **ORANGE-River**.

**TAMBOPALLA**, a town of Peru, in the diocese of Arequipa, at the mouth of the Nombre de Dios; 48 miles S. of Arequipa. S. lat.  $17^{\circ} 10'$ .

**TAMBOS**, in *Peruvian Antiquity*, buildings placed at certain distances, for the lodging of the princes of that country, in their travels through their dominions. See *M. de la Condamine*, in *Mem. de l'Acad. de Berlin*, tom. ii. p. 435; who tells us (p. 438.) that he saw several remains of these tambos, in his journey from Quito to Lima.

**TAMBOV**, in *Geography*, a city of Russia, on the Tzna, capital of a government, and see of a bishop; 228 miles S.E. of Moscow. N. lat.  $52^{\circ} 48'$ . E. long.  $41^{\circ} 4'$ .

**TAMBOUR**, in *Architecture*, a term applied to the

Corinthian and Composite capitals, as bearing some resemblance to a drum, which the French call *tambour*.

Some choose to call it the *vase*, and others *campana*, or the bell.

**TAMBOUR** is also used for a little box of timber work, covered with a ceiling, within the porch of certain churches; both to prevent the view of persons passing by, and to keep off the wind, &c. by means of folding-doors, &c.

**TAMBOUR** also denotes a round course of stone, several of which form the shaft of a column, not so high as a diameter.

**TAMBOUR**, in the *Arts*, is a species of embroidery.

The tambour is an instrument of a spherical form, upon which is stretched, by means of a string and buckle, or other suitable appendage, a piece of linen or thin silken stuff; which is wrought, with a needle of a particular form, and by means of silken or gold and silver threads, into leaves, flowers, or other figures.

**TAMBOUR**, Fr., a drum; which see.

**TAMBOUR de Basque**, a small drum used by the Biscayans as an accompaniment to the flageolet, or octave flute: a tabor and pipe.

**TAMBOURIN**, a French dance, much in favour formerly on the French stage in all the opera dances of Lulli and Rameau. The air is gay and in common time.

**TAMBOURISSA**, or **TAMBOURÉCISSA**, in *Botany*, Sonnerat's name for what is now called **MITHRIDATEA**; see that article. The French appellation of this tree, Bois Tambour, or Drum-tree, might be supposed to allude to the lightness and hollowness of the wood, or to its use, were not this word evidently derived from the Madagascar name of the same tree, *Ambora*.

**TAMBOVSKOE**, in *Geography, a government of Russia, bounded on the north by the government of Vladimir, on the east by the governments of Nizgorod, Penza, and Saratov; on the south by the government of Saratov; and on the west by the governments of Riazan and Voronez; about 200 miles in length, and from 80 to 100 in breadth. N. lat.  $51^{\circ} 36'$  to  $55^{\circ} 20'$ . E. long.  $38^{\circ} 30'$  to  $48^{\circ}$ .*

**TAMBRAUX**, in *Ancient Geography*, a town of Asia, in Hyrcania, which, according to Polybius, was large, and had a royal palace.

**TAMBRAY**, in *Geography*, a town of Hindoostan, in Travancore; 60 miles N.N.W. of Anjenga.

**TAMBRO**, a river of Spain, which runs into the Atlantic, near Muros, in Galicia.

**TAMBUCO**, or **TABUCO**, a town on the east coast of the island of Celebes, situated in a bay to which it gives name. S. lat.  $2^{\circ} 50'$ .

**TAME**, a river of England, which rises near Winslow, in the county of Buckingham, and runs into the Thames at Dorchester, in Oxfordshire.—Also, a river of England, which rises near Dudley, in the county of Stafford, and runs into the Trent, about 7 miles above Burton.

**TAME**. See **THAME**.

**TAMEGA**, a river of Portugal, which runs into the Duero, 10 miles S. of Amarante.

**TAMEGAN**, a town of the island of Ceylon; 48 miles S. of Candi.

**TAMERLANE**, in *Biography*. See **TIMOUR**.

**TAMETAVE**, in *Geography*, a town on the E. coast of Madagascar. S. lat.  $18^{\circ} 5'$ . E. long.  $49^{\circ} 41'$ .

**TAMIA**, in *Ancient Geography*, a town of the isle of Albion, in the vicinity of Banatia and Alata Castra. Ptolemy assigns it to the Vacomagi.

**TAMIAGUA**, in *Geography*, a river of Mexico, which joins the Tupa at its mouth.—Also, a town of Mexico, in the province of Guateca.

**TAMIEH**, a town of Egypt, on a canal which forms a communication between the Nile and the Birket el Kerun; 12 miles N.E. of Fayoum.

**TAMINIZ**, a river of Carniola, about four miles in extent; 4 miles S.E. of Veit. It has no visible communication with any other river.

**TAMINO**, a river of Switzerland, which runs into the Rhine, 2 miles S. of Sargans.

**TAMISRA**, denoting darkness, a name of one of the hells of the Hindoos, of which they had upward of a score. Another of the Hindoo hells is named Andha Tamisra, meaning *utter darkness*; and as these purgatories are differently placed, this is supposed to be the one situated in the bowels of the earth, and its degree of punishment an aggravation of the easier penalties inflicted in Tamisra. In the Institutes of Menu it is ordained, that "a twice-born man, who barely assaults a Brahmin with an intention to hurt him, shall be whirled about for a century in the hell called Tamisra." (Ch. iv. v. 165.) By "a twice-born man" is meant an individual of one of the three first tribes or sects, they being susceptible of regeneration by the investiture of the *zenaar*; which see. See also O'M, and *SECTS of Hindoos*.

**TAMLOOK**, in *Geography*, a town of Bengal; 35 miles S.W. of Calcutta.

**TAMMAPUL**, a town of Mexico, in the province of Guateca; 105 miles N.W. of Panuco.

**TAMMELA**, a town of Sweden, in the province of Tavastland; 22 miles S.W. of Tavasthus.

**TAMMERFORS**, a town of Sweden, in the province of Tavastland; 36 miles N.N.W. of Tavasthus.

**TAMMESBRUCK**, a town of Saxony, in Thuringia, near the Unstrutt; 1 mile from Langen Salza.

**TAMMOWISCHKEN**, a town of Prussian Lithuania; 3 miles E. of Insterburg.

**TAMNUM**, in *Ancient Geography*, a town of Gallia Aquitania, upon the route from Burdigala to Augustodunum; now *Talmon*.

**TAMNUS**, in *Botany*, Tourn. t. 28. Juss. 43, a more correct name, perhaps, than that of *TAMUS*, used by Linnaeus, which will be found in its proper place. The word has been corrupted occasionally into *Tamarus* and *Tannus*.

**TAMOATA**, in *Ichthyology*, the name of an American fresh-water fish, called by the Portuguese *folhido*.

It is a small oblong fish, with a flat head, somewhat like that of a frog. Its mouth is small, and from each angle of it there hangs a long single filament, by way of a beard. It has no teeth, and its eyes are extremely small. It has eight fins; two at the gills, of one finger in length, and hard and firm like horns; two on the belly, of a softer substance; and one on the middle of the back, another near the tail, and another small one opposite to it on the belly; its tail is the eighth; its whole head is covered above with a hard coat like a shell; and its body with a sort of coat of mail made up of oblong, hard, squamous bodies, dented at their edges; its colour is a sort of rusty iron-colour. It is accounted a very well-tasted fish. It lives only in fresh-water rivers; and, it is said, when the water where it is dries up, it will crawl out upon the land, and go in search of more. Margrave.

**TAMOLA**, in *Geography*, a town of Sweden, in the province of Tavastland; 20 miles S.W. of Tavasthus.

**TAMONEA**, in *Botany*, a name of Aublet's, said by De Theis to be in use among the inhabitants of Guiana, but this does not appear from any thing mentioned in the original

author. Aubl. Guian. 659. t. 268. Juss. 109. Lamarck Illustr. t. 542. *Verbena lappulacea* of Linnaeus is referred by Jussieu to this genus. (See *VERBENA*.) We are not certain whether *Tamonea* ought to be admitted as a genus, and therefore need not stay to object to the name.

**TAMONTACA**, in *Geography*, a town on the west coast of the island of Mindanao. N. lat. 7° 2'. E. long. 124° 36'.

**TAMOOK**, a small island in the Sooloo Archipelago. N. lat. 6° 21'. E. long. 121° 58'.

**TAMOS**, in *Ancient Geography*, a promontory which formed mount Taurus, in the Eastern ocean.

**TAMPASSOOK**, in *Geography*, a town on the north-west coast of the island of Borneo. N. lat. 6° 21'. E. long. 116° 13'.

**TAMPICO**, a sea-port of Mexico, in the province of Guateca, situated in the bay of the gulf of Mexico; 30 miles S.E. of Panuco. N. lat. 22° 40'. W. long. 98° 36'.

**TAMPICO**, a name given to a river of Spanish North America, called the *Panuco*; which see.

**TAMPING a Hole**, in *Mining*, is used for filling the upper part of a hole, bored in the rock for blasting with gunpowder, upon the charge of powder, with clay or stony matter rammed down very close and tight: and the clay and stone are called the tamping. This operation is called, in the North of England, stemming a hole.

**TAMPION**, *TOMPION*, *Tankin*, or *Tomkin*, a kind of plug or stopple, serving to close a vessel.

The word is formed from the French *tampon*, a bung, stopper, &c. Some derive it from the English *tap*.

In *Gunnery*, the tampions are wooden cylinders put into the mouth of guns, howitzers, and mortars, in travelling, to prevent the dust or wet from getting in. They are fastened round the muzzle of the guns, &c. by leathern collars. At sea they are carefully encircled with tallow or putty, to prevent the penetration of the water into the bore, by which the powder contained in the chamber might be damaged or rendered incapable of service. They are also sometimes used to put into the chambers of mortars, over the powder, when the chambers are not full. Tampions are also iron bottoms, to which the grape-shot designed for sea-service are fixed.

**TAMPISCO**, in *Geography*, a river of Mexico, which runs into the Pacific ocean, N. lat. 10° 38'.

**TAMPOE**, in *Natural History*, the name of an East Indian fruit, approaching to the figure of the mangoustan, but not near so agreeable to the taste. This fruit is very much of the size, shape, and colour of some of our common summer-apples; but its skin is very thick and tough, and it has no crown. The Indians eat it in places where better fruits are scarce, and in some places call it the mangoustan.

**TAM-SAN-HOTUN**, in *Geography*, a town of Chinese Tartary. N. lat. 40° 20'. E. long. 123° 48'.

**TAMSHUC MOUNTAINS**, mountains of Thibet; 30 miles N. of Dharmasaleh.

**TAMSWEG**, a town of the archbishopric of Salzburg; 12 miles W. of Muehrau.

**TAMUADA**, in *Ancient Geography*, a river of Africa, in Mauritania Tingitana.

**TAMUGADA**, a town of Africa, in Mauritania, on the route from Lambese to Cirta Colonia.

**TAMUS**, in *Botany*, an old name, sometimes written *TAMUS*, see that article, and supposed to be taken from the *Uva Tamina* of Pliny, which appears to have belonged to the plant now called Black Bryony. To this therefore the above name is at present appropriated.—Linn. Gen. 524.

Schreb.

Schreb. 691. Willd. Sp. Pl. v. 4. 772. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 1078. Prodr. Fl. Græc. Sibth. v. 2. 258. Ait. Hort. Kew. v. 5. 386. (Tamnus; Tourn. t. 28. Juff. 43. Lamarck Illustr. t. 817.)—Clas and order, *Dioecia Hexandria*. Nat. Ord. *Sarmentaceæ*, Linn. *Asparagi*, Juff.

Gen. Ch. Male, *Cal.* Perianth in six deep, ovato-lanceolate segments, most expanded in their upper part. *Cor.* none; except the calyx be so considered, which we have recommended in a parallel case, see *SMILAX*. *Stam.* Filaments six, simple, shorter than the calyx (or corolla); anthers erect.

Female, *Cal.* (or *Cor.*) of one piece, bell-shaped, in six deep, lanceolate, spreading segments, superior, deciduous. Nectary an oblong depression in the base of each segment, at the inside. *Pist.* Germen inferior, large, ovate-oblong, smooth; style cylindrical, three-cleft, the length of the calyx (or corolla); stigmas three, reflexed, emarginate, acute. *Peric.* Berry ovate, of three cells. *Seeds* two in each cell, globose.

Ess. Ch. Male, Calyx (or rather Corolla) in six deep segments. Female, Calyx (or rather Corolla) in six deep segments. Style three-cleft. Berry inferior, of three cells. Seeds two in each cell.

1. *T. communis*. Common Black Bryony. Linn. Sp. Pl. 1458. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 91. Mill. Illustr. t. 89. (Bryonia nigra; Ger. Em. 871. Vitis nigra; Matth. Valgr. v. 2. 622. Camer. Epit. 988.)—Leaves heart-shaped, undivided.—Native of hedges, woods, and bushy places, in the more temperate parts of Europe, as well as in the Levant. It is common in England, not in Scotland, flowering in June, and laden with bunches of scarlet berries in autumn, till rotten with wet and frost. Dr. Sibthorp found this plant frequent in Greece, as well as in the isles of Crete and Cyprus. The young sprouts boiled are eaten in the latter, like asparagus, to which they are naturally allied. The fleshy perennial root is blackish externally, whence the ancient, as well as English, name. *Stems* annual, herbaceous, branched, twining round every thing in their way, and thus climbing, without tendrils, to a considerable height, till they become elegantly pendent in festoons. *Leaves* alternate, stalked, entire, acute, many-ribbed, smooth. *Stipulas* small, awl-shaped, spreading, in pairs at the base of each footstalk. *Flowers* in long, greenish, axillary clusters. *Berries* oval, the size of a large currant, bright red, insipid. The root is acrid. Its pulp scraped has formerly been used as a stimulating plaster.

2. *T. elephantipes*. Tuberous Cape Black Bryony. L'Herit. Sert. Angl. 29. Ait. n. 2. Willd. n. 2. Curt. Mag. t. 1347.—Leaves kidney-shaped, undivided. Root elevated, corky and tessellated.—Found at the Cape of Good Hope, near the town, by Mr. Masson, who sent it to Kew in 1774. A male plant flowered there, in the stove, in 1783, from whence L'Heritier caused a drawing to be made, but this plate never appeared. A female, originally imported by Mr. George Hibbert, flowered in Mr. Knight's greenhouse, and being published in the Botanical Magazine, has determined the genus, by its inferior germen, a point previously only guessed at. The singular appearance of the great fleshy root, rising out of the ground, a foot in diameter, and covered with angular, tessellated, brown knobs, more resembles the clumsy shell of some huge tortoise, than an elephant's foot. This uncouth mass sends forth in the spring a slender, twining, annual stem, about eight feet long, not unlike the last; but the leaves are very different, kidney-shaped, with strong ribs; their ends either emarginate, or abrupt with a small point. *Footstalks* tumid, or jointed, at each end.

*Flowers* yellowish-green. *Germen* oblong, furrowed. *Fruit* not yet observed.

3. *T. cretica*. Cretan Black Bryony. Linn. Sp. Pl. 1458. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 958, unpublished. (Tamnus cretica, trifido folio; Tourn. Cor. 3.)—Leaves three-lobed.—Not rare in the woods and hedges of Crete and Cyprus, as well as Greece. *Sibthorp*. Miller appears to have cultivated it in 1739, but we have never met with a plant in gardens, nor is this species likely to be a popular favourite. It differs from the first chiefly in having a deep lateral sinus, on each side of the leaves, and twin clusters of flowers, one much longer than its companion. We know nothing of the fruit.—The young shoots are eaten boiled.

TAMUS, in *Gardening*, furnishes plants of the hardy, herbaceous, climbing, perennial kind, among which the species most generally grown are the common black bryony (*T. communis*); and the Cretan black bryony (*T. cretica*). The first sort has a very large tuberous root, which is blackish externally; the stems are smooth, twining about every thing in their way, and thus ascending, without the aid of tendrils, to the height of ten or twelve feet in hedges or among bushes, which their festoons of tawny leaves and red berries decorate in the autumnal season.

But the second species has a rounder root than the former; yet the stalks twine in the same manner.

*Method of Culture*.—All these plants are readily increased by sowing the seeds soon after they are ripe, under the shelter of bushes, where, in the spring, the plants will come up, and require no further care; or in beds to be afterwards planted out. The roots will abide many years, and sometimes send up suckers, from which plants may be raised by setting them out in the autumn or spring where they are to remain.

The thick fleshy root of the first sort is sometimes cultivated for use in the shops.

Both the plants are useful in thickets, and in the wilder parts of pleasure-grounds.

TAMUSIDA, in *Ancient Geography*, a town of Africa, in Mauritania Tingitana, between Banafa and Silda.

TAMUSIGA, a town of Africa, in Mauritania Tingitana, on the sea-coast, between the port of Hercules and the promontory Ufadium.

TAMUZ, in *Chronology*, the fourth month of the Jewish ecclesiastical year, answering to part of our June and July. The 17th day of this month is observed by the Jews as a fast, in memory of the destruction of Jerusalem by Nebuchadnezzar, in the 11th year of Zedekiah, before Christ 588.

TAMWORTH, in *Geography*, is a borough and market-town, situated partly in the hundred of Offlow, county of Stafford, and partly in the hundred of Hemlingford, county of Warwick, England: at the distance of 22 miles S.E. from Stafford, 27 miles N. by W. from Warwick, and 116 miles N.W. from London. It is seated near the confluence of the rivers Tame and Anker, the former of which runs through the town, and divides it into two nearly equal parts. Tamworth appears to have been of considerable note at an early period; and was the occasional residence of the Mercian kings. Offa dates a charter to the monks of Worcester from his palace here in the year 781; and several of his successors in the next century also date their grants from the same place. At that period, a ditch, forty-five feet in breadth, protected the town and royal demesne on the north, west, and east; the river serving as a defence on the south side. Of this ditch, some vestiges can still be traced, and at two angles which it forms, are two mounds, probably raised as foundations for towers. On the invasion of this kingdom

by the Danes, Tamworth was almost, or totally, destroyed. Ethelfleda, the daughter of the illustrious Alfred, is said to have rebuilt it in 913, after she had, by her prudence and valour, freed her brother's dominions from the invaders. She also erected a tower on an artificial mount, which forms the site of the present castle; and here she generally resided till her death, in 918. The castle was bestowed by William the Conqueror on Robert Marmion, whose descendants held it till 20 Edward I., when it passed by marriage to the Freville family; that of Ferrers succeeded in the reign of Henry VI.; and they were followed by the Comptons. This venerable fabric is still in a good state of preservation, as to its exterior; but the inside has suffered much from age and neglect. The rooms are numerous, but ill-suited to the liberal domestic manners of the present era; and the whole is chiefly attractive as a monument of antiquity. The town of Tamworth is large and well-built. It was incorporated by queen Elizabeth on a scale peculiarly liberal: the corporation consists of two bailiffs, a recorder, high steward, under steward, a town-clerk, and twenty-four principal burghesses: one of the bailiffs is chosen from each county. Tamworth has sent two representatives to parliament ever since the year 1563. The right of election is in the inhabitants paying scot and lot: and the members are returned jointly by the sheriffs of Warwickshire and Staffordshire. The church is a spacious edifice. The most ancient portion exhibits two round-headed arches, embellished with zig-zag mouldings: whence it seems probable that the original edifice was constructed soon after the Conquest. The church was rendered collegiate by the Marmion family at an early period for a dean and six prebendaries; with several lay prebendaries, which are still attached to the church. The college was granted by queen Elizabeth in 1581 to Edward Downing and Peter Ashton. An hospital was established in this town by Philip Marmion in the 15th year of Edward I. On its site another was founded and endowed by Mr. Guy, to whom the borough of Southwark is indebted for the noble hospital which bears his name. A grammar-school, founded by queen Elizabeth, is still well supported. Here are some manufactures, the chief of which is that of superfine woollen cloths: but this trade, though still respectable, has much decreased. The printing of calicoes, the tanneries, the manufacture of flax, and the spinning of yarn, are branches of business which have considerably advanced. A weekly market, under queen Elizabeth's charter, is held on Saturdays: and three fairs annually. In the population return of the year 1811, the Staffordshire division of Tamworth was stated to contain 279 houses, and 1327 inhabitants; the Warwickshire division 325 houses, and 1666 inhabitants: making a total of 2993 persons, occupying 604 houses.

About four miles south-east of Tamworth is Pooley-Hall, the seat of the honourable colonel Finch. The lands attached to this residence formed part of the possessions of the Marmions; and after several intermediate transmissions, came to the family of Cokaine, in the latter part of the 14th century. It is ascertained that sir John Cokaine resided at Pooley in the reign of Henry IV., and his descendants, for many generations, made it their principal seat. The present mansion was erected by sir Thomas Cokaine, temp. Henry VIII., and is a fine but irregular building, varying in character between the embattled style of the previous troubled and suspicious ages, and the open amplitude of construction then first growing into practice.—*Beauties of England and Wales*, vol. xiii. Staffordshire, and vol. xv. Warwickshire, by J. N. Brewer.

TAMWORTH, a town of America, in New Hamp-

shire; 56 miles N. of Portsmouth; containing 1134 inhabitants.

TAMYRACA, in *Ancient Geography*, a town of European Sarmatia, near the Carcinite gulf.

TAN, the bark of the oak, chopped, and ground by a tanning-mill into a coarse powder; to be used in the tanning or dressing of skins. See TANNIN.

New tan is the most esteemed; when old and stale, it loses a great deal of its effect, which consists in condensing or closing the pores of the skins; so that the longer the skins are kept in tan, the greater strength and firmness they acquire.

This bark, which is more abundant in the gummy resinous part than any of our common indigenous astringents, and which, on account of its astringent, gummy, resinous property, serves both to preserve leather from rotting, and to render it impervious to water, is preferred to all other substances for the purpose of tanning. It is used either in the way of infusion, which is called ooze; or the dry powder is strewed between layers of hides and skins, when these are laid away in the tan-pits. The ooze is made by macerating the bark in common water, in a particular set of holes or pits, which, by way of distinction from the other holes in the tanyard, are called leches. See TANNING.

Every part of the oak-tree, of what age or growth soever, is fit for the tanner's use, and all oaken coppice-wood, of any size or age, being cut and procured in barking-time, will tan all sorts of leather; at least, as well as the bark alone. When this material is got at the proper season, it must be very well dried in the sun, more than the bark alone; thence it is to be cut up, and preserved in a covered place for use.

When it is to be used, the greater wood must be first cleft small, to fit it for the beating and cutting-engine; and the smaller must be put into the engine as it is: which done, it must be again dried upon a kiln, and after that, ground in the same manner that the tanners grind their bark. Such wood as is to be used presently after it is gotten, will require the better and the more drying upon the kiln; and if this is omitted, it will blacken and spoil all the leather it is used about. Where oak is scarce, black-thorn, or sloe-tree, will tolerably well supply its place; and where that is not to be had in sufficient plenty, the white-thorn will do. *Phil. Tran.* N<sup>o</sup> 108.

Birch also, being ordered in the same manner with oak, is fit for some uses in tanning, particularly it does very well for tanning of shoe-sole leather. All these ingredients will tan much better than bark alone; and that with much less charge; so that this discovery may very well save the felling of trees when the bark is wanted, at a season when the sap is up, which, when it is done, causes the outside of the trees to rot and grow worm-eaten; whereas, if the trees had been felled in winter, when the sap is down, they would have been almost all heart, as the people express it, and not subject to worms. This manner of using the wood with the bark, in tanning, will also increase the value of underwoods very considerably. *Phil. Tranf.* N<sup>o</sup> 105.

The engine necessary for cutting the wood consists of a long square wooden block, and some pieces of iron to be fastened on and used about it, *viz.* a hammer, an anvil, an iron holding the wood to be bruised and cut, and a knife to cut it. The whole is a very simple and cheap machine, and is described at large, and figured in the above-mentioned number of the *Philosophical Transactions*.

By M. de Buffon's experiments upon different skins, it was found that a decoction of young oak-wood succeeded perfectly well in tanning sheep and calves' skins, but did

not do equally well for ox, and the other harder skins. This, however, he imagines, might be only for want of knowing the best method of using the wood. And certainly these trials deserve to be farther prosecuted; since the small branches of the oak, which are of little value, might be thus made to supply the place of a much dearer commodity, the bark; and as in many trees the bark of the young branches is found to be of greatly more virtue than that of the larger branches, or the trunk, the use of these small boughs, bark and all, might very probably be found to answer to all the effects of the bark of the larger kind alone. *Memoirs Acad. Scienc. Par.* 1736.

The Society of Arts, &c. granted a premium of 100*l.* in the year 1765, for the discovery of a method of tanning with oaken saw-dust; but the acquisition has not hitherto had its desired effect; though it is said that the use of oaken saw-dust has been advantageously adopted in Germany. *Doffie's Mem. of Agr.* vol. i. p. 227.

We are told, in *Phil. Trans.* N<sup>o</sup> 36, that the operation of tanning is performed, on leather, better in the West Indies than in England. They use three sorts of bark, the man-grove-bark, the olive-bark, and another; and the whole business is so soon done, that a hide delivered to them, is in six weeks ready to be worked into shoes, though they bestow less labour than we do.

Mr. Albert Gefner, first physician to the duke of Wirtemberg, having made some experiments on the dust of heath, dried in an oven, and afterwards pulverized, as a substitute to that of oak-bark in tanning, found that the leather prepared by this method was very good; but he observes, that the operation is much more tedious. (*Hist. R. A. S. Paris*, for 1756.) Others have proposed a trial of the small branches of heath, and the leaves of oak.

TAN, in *Gardening*, a substance of the oak-bark, or other similar kinds, after it has been ground and soaked in the ooze of the tanners' vats, and properly dried, is used for the purpose of making hot-beds, for forcing many sorts of exotic plants that require a durable steady heat.

It has not been of very long use in England, and was brought to us from Holland in the reign of king William, and then used for the raising of orange-trees; but after this period it became disused; and it is of a much later date, *viz.* about the year 1719, that it has been brought into use again for the raising of the pine-apple, since which time it is become generally used, wherever it is to be had, for all the purposes of the hot-bed, in raising tender exotic plants.

Refuse tan, made up into cakes, serves as fuel, in circumstances where a gentle and continued fire is advantageous. See *BARK-Bed*, *HOT-Bed*, *HOT-House*, and *STOVE*.

TAN, *Flower of*, is a name given by the people employed in the tanning-trade, to a yellow substance, often found upon old tan, or oak-bark broken to pieces, which has been used as tan, and is of no farther service.

The name, however, is very improper; and though every body conversant in tan-yards must have seen the thing, yet it has always passed as an efflorescence of the bark, till the curious Mr. Marchand inquired more accurately into its nature, and found it to be a plant of itself, wholly different from the matter of the tan; and to which the bark, which had been often wetted and dried again, served as a proper matrix. He found it to be more nearly allied to the sponge, than to any other genus of plants, and therefore named it *Spongia fugax mollis flavia & amana in pulvere coriario nascentis*, soft, beautiful, yellow-fading sponge, growing on tanners' bark.

It makes its appearance most frequently in the summer-

months, and is then seen in small tufts of a beautiful yellow colour, on different parts of the old heaps of bark. It appears at first in form of a thin yellow scum, and is of a sort of jelly-like structure; but it every day grows larger and thicker, till it stands above half an inch out from the surface of the bark. As it grows, its surface becomes more and more cavernous and spongy, the pores or holes being of different diameters, and the interstitial matter forming a sort of net-work more or less regular, and often interrupted by irregular prominences in several parts; and, in fine, when the growth is complete, the whole more resembles a sponge than any vegetable substance, and is of a deep yellow colour, and considerably thick and tough consistence; there are no roots to be discovered issuing from it; its smell is like that of rotten wood, and its taste is somewhat styptic. It always appears in the warm months, and always upon such old tan as has begun to ferment, and is in the state in which our gardeners use it for hot-beds. If it happens to stand exposed to the south sun, it is but of short duration; but if it be in a sheltered place, it will last a considerable time, and often spread itself to a great extent, and make a very beautiful figure for many weeks. *Mem. Acad. Par.* 1727.

*TAN-Bed*, in *Gardening*. See *BARK-Bed*.

*TAN-Pit*. See *BARK-Pit*.

*TAN-Spud*, in *Rural Economy*, the name usually given to a particular sort of tool used for peeling of the bark from oak, and some other trees, in certain districts; but in others they employ several different implements for effecting this purpose.

*TAN-Stove*. See *HOT-House* and *STOVE*.

TANA, in *Geography*, the most considerable river in Finmark.

TANACETUM, in *Botany*, Tanfy, a barbarous Latin word, of which, like *Osmunda*, it is scarcely possible, as Linnæus remarks, *Phil. Bot.* 160, to determine the meaning, or from what language it is derived. Of *OSMUNDA* we have attempted an explanation. (See that article.) De Theis cites Linnæus and Dodonæus as deducing *Tanacetum* from *Athanasia*; but we find no such etymology given by them, though several writers speak of these words as synonymous, and some lexicographers give that explanation. *Αθανασία*, as expressing an unfolding, or everlasting, flower, is little applicable to our Tanfy.—*Linn. Gen.* 417. *Schreb.* 549. *Willd. Sp. Pl.* v. 3. 1809. *Mart. Mill. Dict.* v. 4. *Sm. Fl. Brit.* 862. *Prodr. Fl. Græc. Sibth.* v. 2. 167. *Ait. Hort. Kew.* v. 5. 1. *Pursh* 522. *Juss.* 184. *Tourn.* t. 261. *Lamarck Illustr.* t. 696. *Gærtn.* t. 165.—Class and order, *Syngenesia Polygamia-superflua*. *Nat. Ord. Compositæ discoidæ*, Linn. *Corymbifera*, Juss.

*Gen. Ch.* *Common Calyx* hemispherical, imbricated, with acute compact scales. *Cor.* compound, tubular, convex. Florets of the disk numerous, funnel-shaped, with five reflexed segments in the limb, all perfect: those of the radius few, small, three-cleft, most deeply divided at their inner side. *Stam.* in the perfect florets, Filaments five, capillary, very short; anthers united into a cylindrical tube. *Pist.* in the perfect florets, Germen oblong, small; style thread-shaped, the length of the stamens; stigma in two revolute segments: in the female ones, Germen oblong; style simple; stigmas two, reflexed. *Peric.* none, except the unchanged calyx. *Seeds* solitary, oblong, crowned with more or less of a slight margin. *Recept.* convex, naked.

*Obs.* Sometimes the radius is wanting, all the florets being, in that case, perfect. The seeds of some species are said to want the crown.

## TANACETUM.

Eff. Ch. Receptacle naked. Seeds crowned with a border. Calyx imbricated, hemispherical. Florets of the radius three-cleft, obsolete, sometimes wanting.

1. *T. vestitum*. Leafy Cape Tanfy. Thunb. Prodr. 147. Willd. n. 1. — "Leaves slender, triangular, imbricated. Panicle terminal."—Native of the Cape of Good Hope. *Thunberg*.

2. *T. longifolium*. Long-leaved Cape Tanfy. Thunb. Prodr. 147. Willd. n. 2. — "Leaves linear-thread-shaped. Cluster terminal, level-topped."—Found in the same country.

3. *T. linifolium*. Flax-leaved Cape Tanfy. Thunb. Prodr. 147. Willd. n. 3. Ait. n. 1. (*Athanasia linifolia*; Linn. Suppl. 361.)—Leaves linear-lanceolate, channelled, taper-pointed. Cluster terminal, simple, corymbose. —Native of the Cape of Good Hope. Sent to Kew by Mr. Masson in 1774. A green-house shrub, flowering in August. The stem is simple, round, and smooth, clothed with alternate, simple, linear or awl-shaped leaves. Flowers ovate, smooth, yellow. The length of the leaves is variable.

4. *T. axillare*. Axillary Cape Tanfy. Thunb. Prodr. 147. Willd. n. 4. — "Leaves linear-thread-shaped, combined at the base. Flowers axillary, sessile."—Gathered by Thunberg at the Cape.

5. *T. uliginosum*. Marsh Levant Tanfy. Prodr. Fl. Græc. n. 2029. Fl. Græc. t. 855, unpublished. (*Santolina vermiculata cretica*; Tourn. Inst. 461?)—Leaves linear; the lower ones with one lateral tooth. Stalks solitary, terminal, single-flowered.—Gathered by Dr. Sibthorp in boggy parts of the isle of Cyprus, intermixed with *Juncus bufonius*. The root is annual, simple, tapering, with many whitish fibres. Stems several, ascending, branched from the bottom, three or four inches high, round, smooth, leafy. Leaves alternate, sessile, an inch long, acute, channelled, smooth, mostly entire; a few of the lower ones only dilated slightly at the end, and furnished with a lateral tooth. Flowers terminal, solitary, yellow, hemispherical, each on a simple, naked, smooth, erect stalk, two or three inches in length, purplish at the top. Seed, according to Mr. Bauer's drawing, crowned with an oblong tubular scale, split on one side.

6. *T. suffruticosum*. Shrubby Cape Tanfy. Linn. Sp. Pl. 1183. Willd. n. 5. Ait. n. 2. Thunb. Prodr. 146. (*T. africanum fruticosum multiflorum, foliis tanaceti vulgaris decuplo minoribus*; Comm. Hort. v. 2. 199. t. 100.)—Leaves in many pinnate, subdivided, acute, somewhat downy segments. Stem shrubby. Flowers corymbose, level-topped.—Native of the Cape of Good Hope, from whence the Dutch obtained seeds above a century ago, and it probably soon found its way into our more curious green-houses. The plant has little to attract general admiration, though the leaves are delicately divided, and the leafy branches are terminated by abundance of little golden corymbose flowers, whose calyx is membranous and shining.

7. *T. sibiricum*. Long-leaved Siberian Tanfy. Linn. Sp. Pl. 1183. Willd. n. 6. (T. n. 116; Gmel. Sib. v. 2. 134. t. 65. f. 2.)—Leaves pinnate; leaflets linear-thread-shaped, entire; undivided or three-cleft. Flowers corymbose, level-topped. Calyx-scales nearly orbicular, smooth.—Gathered by Steller, in dry mountainous parts of Siberia, beyond the lake Baical, flowering in June and July. The root is brown, rather thick, with many fibres running deep into the ground, and apparently perennial. Stems about eighteen inches high, erect, round, striated, smooth, somewhat leafy; branched and corymbose at the top. Leaves acute, not unlike those of Southernwood, but smooth; the

lower ones on long stalks; the uppermost sessile, at the base of each branch. Flowers bright yellow, partly drooping, encompassed by the white membranous edges of the green orbicular scales of the calyx.

8. *T. argenteum*. Silvery Armenian Tanfy. Willd. n. 7. "Ejusd. Achill. 51. t. 2. f. 4." (*Achillea argentea*; Lamarck Dict. v. 1. 29. *Parmica orientalis, foliis argenteis conjugatis*; Tourn. Cor. 38.)—"Leaves pinnate, clothed with silky down; leaflets lanceolate, slightly toothed at the extremity. Corymb terminal."—Gathered by Tournefort in Armenia. This is said to bear some resemblance to the *Achillea Clavenna*. The stem is about a foot high, simple, channelled, covered, like the rest of the herb, with silky down. Leaves alternate, stalked, with linear or lanceolate leaflets, most of which, especially in the radical leaves, have two or three teeth towards the end. Flowers probably white. Receptacle constantly naked. Calyx membranous at the edge of the inner scales. *Lamarck, Willdenow*.

9. *T. angulatum*. Dropwort-leaved Tanfy. Willd. n. 8. "Ejusd. Achill. 52. t. 2. f. 3." (*Achillea filipendulina*; Lamarck Dict. v. 1. 27. *Parmica orientalis, tanaceti folio et facie, flore minimo*; Tourn. Cor. 38.)—Leaves pinnatifid; segments lanceolate, serrated. Corymb dense. Calyx angular.—Gathered in the Levant by Tournefort. Stem a foot, or rather more, in height, channelled, almost smooth, but sparingly leafy in the upper part. Lower leaves two or three inches long, deeply pinnatifid, green, and smooth; upper about half as long. Flowers yellow, in a small dense corymbus. Florets of the radius scarcely more than two or three, very short. Receptacle elevated, furnished with a very few scales at the margin. *Willd. Lamarck*.

10. *T. microphyllum*. Small-leaved Siberian Tanfy. (*Achillea* n. 164; Gmel. Sib. v. 2. 198. t. 83. f. 2. *Parmica millefolii folio tomentoso, flore luteo*; Gerb. MSS. in Herb. Linn.)—Leaves pinnate; leaflets bipinnatifid, hairy, obtuse. Flower-stalks corymbose, hairy. Calyx smooth.—Gathered by Gerber, in deserts, on both sides of the river Don, near upper Kundruchewa. He remarked that the receptacle is devoid of scales, which induces us to introduce this plant here, though referred to *Achillea* by Gmelin. Linnæus has passed it over. The root is woody and apparently perennial. Stem a span high, more or less branched, leafy, angular, and downy. Leaves stalked, hairy, finely subdivided and notched. Flowers yellow, rather hemispherical than cylindrical. Calyx-scales oblong, ending in a suddenly dilated white membrane; the base of the outward ones only occasionally hairy, or fringed. Florets of the radius very short, three-toothed.

11. *T. incanum*. Hoary Oriental Tanfy. Linn. Sp. Pl. 1183. Willd. n. 9. (*Abinthium orientale incanum tenuifolium, floribus luteis in capitulum congestis et fursum spectantibus*; Tourn. Cor. 34.)—Leaves pinnate, hoary; leaflets crowded, in deep finger-like segments. Corymbs dense, compound, somewhat panicled.—Native of the Levant. The stem is said by Linnæus to be simple, leafy, and very short. We have seen neither specimen nor figure.

12. *T. cotuloides*. May-weed Cape Tanfy. Linn. Mant. 282. Willd. n. 10.—Leaves deeply pinnatifid, pointed, hairy, dotted. Stem much branched. Flowers somewhat panicled. Calyx-scales elliptical, nearly equal.—Native of the Cape of Good Hope. Root somewhat woody, with many fibres; Linnæus judged it to be annual. Stem about a span high, copiously branched, round; branches ascending, leafy, hairy. Leaves numerous, scattered, stalked, hardly an inch long, in seven or nine deep, acute, entire segments, clothed, on the lower side at least, with very long straight

## TANACETUM.

straight loose hairs. *Flower-stalks* panicled, hairy, leafy, somewhat corymbose. *Flowers* small, hemispherical, rather convex, yellow, with few or no radiant florets. *Calyx-scales* acute, rather lax, roughish, with thin pale edges.

13. *T. orientale*. Silky-leaved Oriental Tanfy. Willd. n. 11. (*Abinthium orientale incanum, capillaceo folio, floribus in capitulum congestis*; Tournef. Cor. 34.)—"Leaves silky and hoary; the radical ones pinnate; leaflets in three deep, linear-thread-shaped, acute segments; stem-leaves in three deep, lanceolate segments. Panicle densely corymbose."—Native of Armenia. *Root* perennial. *Leaves* of the root and barren stems about three-quarters of an inch long, on still longer *footstalks*; those of the flowering stem broader, their segments flat, occasionally divided. *Panicle* corymbose, terminal. *Flowers* sessile, in round heads, upon crowded stalks. *Calyx* downy. *Receptacle* naked. Willd.

14. *T. annuum*. Annual Tanfy. Linn. Sp. Pl. 1184. Willd. n. 12. Ait. n. 3. (*Santolina corymbis simplicibus fastigiatis, foliis linearibus confertis*; Mill. Ic. t. 227. f. 1. Elichryson; Clus. Hist. v. 1. 326. Elyochryson, five Coma aurea; Ger. Em. 645.)—Radical leaves doubly pinnate; those of the stem deeply pinnatifid, downy; their segments sharp-pointed. *Corymbs* level-topped. *Calyx-scales* oblong, hairy.—Native of Spain and Italy. Very soon introduced into our gardens, where it proves a hardy annual, flowering in July and August. The *stem* is two or three feet high, round, furrowed, much branched, clothed with innumerable small crowded pinnatifid *leaves*, of a rather hoary green. *Flowers* yellow, in terminal flat corymbs; the scales of their *calyx* unequal, imbricated, keeled, hairy, tipped with a rounded membrane.

15. *T. obtusum*. Blunt-leaved Cape Tanfy. Thunb. Prodr. 147. Willd. n. 13.—"Leaves doubly pinnate, smooth; leaflets linear, obtuse. Heads of flowers solitary, smooth."—Found by Thunberg at the Cape of Good Hope.

16. *T. grandiflorum*. Large-flowered Cape Tanfy. Thunb. Prodr. 147. Willd. n. 14.—"Leaves doubly pinnate, villous; leaflets linear, acute. Heads of flowers solitary, downy."—From the same country.—We have not seen either of the two last species. Willdenow understands Thunberg's expression, *capitulis solitariis*, as meaning *floribus solitariis*; but the supposition of so great an inaccuracy is scarcely warrantable. We therefore preserve the original sense; whether it be accurate or not must remain with the author.

17. *T. multiflorum*. Many-flowered Cape Tanfy. Thunb. Prodr. 147. Willd. n. 16.—"Leaves doubly pinnate, villous; leaflets acute. Panicles compound, level-topped."—Found by Thunberg at the Cape.

18. *T. myriophyllum*. Millfoil Tanfy. Willd. n. 17. "Ejusd. Achill. 50." (*Achillea bipinnata*; Linn. Sp. Pl. 1265. *Parmica orientalis incana, foliis pennatis, semisofcusculis florum vix conspicuis*; Tournef. Cor. 38.)—Leaves doubly pinnate, downy; leaflets ovate; those of the stem toothed; of the radical leaves entire.—Native of the Levant. Only to be seen perhaps in Tournefort's herbarium, or in collections extracted from thence.

19. *T. vulgare*. Common Tanfy. Linn. Sp. Pl. 1184. Willd. n. 18. Ait. n. 4. Fl. Brit. n. 1. Engl. Bot. t. 1229. Woodv. Med. Bot. t. 115. Fl. Dan. t. 871. (*Tanacetum*; Ger. Em. 650. Matth. Valgr. v. 2. 259. Camer. Epit. 650.)—2. *T. crispum* anglicum; Ger. Em. 650.—Leaves doubly pinnatifid, sharply serrated, naked.—Native of banks, hedges, and borders of fields, in most parts of the middle of Europe; very frequent in England,

flowering in July and August. *Root* perennial, creeping. *Herb* two feet high, leafy, dark green, with a strong balsamic scent, and bitter taste. It was formerly more used than at present to give a flavour, as well as a green colour, to a rich kind of pudding. The *leaves* are copious, sessile, a span long, sometimes a little hairy underneath; clasping the stem with their dilated base. *Flowers* composing a large, flattish, terminal, golden *corymbus*. The *radius* is scarcely remarkable but in hot seasons, though its rudiments may generally be detected. The curled-leaved variety is esteemed most aromatic and wholesome.

Willdenow's fifteenth species, *T. montanum*, Linn. Mant. 111, having a scaly receptacle, is referred to *SANTOLINA*, (see that article,) in the Prodr. Fl. Græcia, by the specific name of *S. rigida*. This is a depressed annual plant, with doubly-pinnatifid pointless *leaves*; single-flowered ascending hairy *stalks*; and a hairy *calyx*, whose scales are nearly equal. The *flowers* are yellow. This is a native of Cyprus, and very nearly akin to *S. anthemoides*, Linn. Sp. Pl. 1180; whose *calyx* is imbricated on all sides, and its *leaves* have brittle-pointed segments.

TANACETUM, in Gardening, furnishes plants of the herbaceous and shrubby perennial kinds, among which the species most commonly cultivated are, the common tanfy (*T. vulgare*); the annual tanfy (*T. annuum*); the common tanfy (*T. balsamita*); the Siberian tanfy (*T. fibiricum*); the shrubby tanfy (*T. suffruticosum*); and the fan-leaved tanfy (*T. flabelliforme*).

In the first sort there are varieties with curled leaves, called double tanfy; with variegated leaves; and with larger leaves, which have little scent.

*Method of Culture*.—All the different herbaceous species are increased by parting the roots, and by seed.

In the first mode the business is effected by slipping or dividing the roots in autumn or winter, when the stalks are decayed; or early in spring, before new stalks shoot forth; planting the slips at once where they are to remain; those for the kitchen-garden, as the common tanfy, &c. in any bed or border a foot and a half asunder; and those intended for variety in the pleasure-ground, singly here and there, at suitable distances, to effect a proper diversity.

The seed sown in autumn should be sown in the spring following, in beds of light earth, broad-cast and raked in, when the plants will soon come up, and in July be fit to prick out in beds, in rows a foot asunder; some to remain, and others to be planted out in autumn where they are to grow.

All the shrubby sorts are easily increased by cuttings of the branches, which should be planted any time in spring and summer, choosing the young and most robust shoots, which should be cut off in proper lengths, and if early in spring, &c. be planted in pots of good earth, several in each, plunging them in a hot-bed, where they will be rooted, and fit for potting off separately in six weeks; or if in summer, the young shoots may be planted in the full ground, in a shady border, or where they may be shaded with mats from the sun; or in pots, and placed in the shade, or under a garden-frame, &c.: in all of which methods, giving plenty of water, they will readily take root; but those in the hot-bed will be forwardest: they, however, will all be well rooted the same season, and should then be transplanted into separate pots, and managed as other shrubby greenhouse plants. See GREEN-HOUSE Plants.

Most of the former sorts require to be afterwards kept free from weeds, cutting down the decayed stalks annually in autumn; and as the roots increase fast into large bunches, spreading

spreading widely round, they should be cut in, or be slipped occasionally, otherwise they are apt to overrun the ground; and to have the ground dug between the plants annually.

All the latter sorts are somewhat tender, but only require shelter from frost, being kept in pots, and deposited among the greenhouse plants, and treated as other shrubby exotics of that collection. They effect a very agreeable variety at all times of the year, but particularly in summer and autumn, when in flower.

The common tanfy has been long cultivated in the garden as a culinary and medicinal herb; the leaves being used occasionally while young and tender, in salads during the spring season, as well as for making cakes, puddings, and many other similar articles. The powder of the dried leaves, the seeds, and the flowers, have also been sometimes employed as a remedy against worms.

The curled and variegated sorts or varieties are principally made use of for ornamental purposes.

The earl of Dundonald has proposed the cultivation of the tanacetum, or tanfy, for the production of potash, asserting that it will yield more of this alkali than can be procured from an equal weight of any other vegetable.

TANACETUM, in the *Materia Medica*. See TANSY.

TANADASSA, in *Ancient Geography*, a town of Africa Propria, on the route from the Grand Leptis to Tacapæ.

TANÆCIUM, in *Botany*, so named by Dr. Swartz, on account of its very long climbing stem and branches, from τανναεις, stretched out, or rather having an elongated point.—Swartz Prodr. 91. Ind. Occ. 1049. t. 20. Schreb. Gen. 412. 834. Willd. Sp. Pl. v. 3. 312. Mart. Mill. Dict. v. 4.—Class and order, *Didynamia Angiosperma*. Nat. Ord. *Luridæ*, or perhaps *Putamineæ*, Linn. Swartz. Akin to *Solanaceæ*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, tubular, undivided, abrupt, nearly or quite entire. Cor. of one petal, long; tube cylindrical, dilated upwards, limb spreading, in five, somewhat unequal, or two-lipped, deep segments. Stam. Filaments four, shorter than the tube of the corolla, two of them rather shorter than the rest, with an intermediate rudiment of a fifth; anthers two-lobed. Pist. Germen superior, roundish, seated on an annular receptacle; style simple, about the length of the stamens; stigma of two thick spreading lobes. Peric. Berry very large, globose or oblong, on a short stalk, of two cells, with a hard coat. Seeds small, numerous, oblong, angular, inserted into a central globose receptacle.

Ess. Ch. Calyx cylindrical, undivided, abrupt. Corolla tubular, rather unequal, five-cleft. Rudiment of a fifth stamen. Berry coated, of two cells, with many seeds.

Obs. This genus surely belongs to the *Luridæ* of Linnæus, and is considerably akin to another genus of Swartz's, the *SOLANDRA*, see that article, though he does not appear to advert to this affinity.

1. *T. parasiticum*. Simple-leaved Tanæcium. Willd. n. 1. Swartz Ind. Occ. 1053. Jacq. Hort. Schoenbr. v. 1. 61. t. 115.—Leaves simple, ovate, coriaceous. Stem shrubby, climbing parasitically.—Native of woods in the western part of Jamaica. Stem when young closely attached by fibrous radicles to the trunks of trees, round, with a grey rugged bark; when full-grown, it often decays below, supporting itself altogether parasitically, and sending out round, spreading, smooth, leafy branches. Leaves opposite, on short thick stalks, five or six inches long, entire, acute, scarcely pointed, smooth, of a fine shining green, with one rib, and many oblique veins. Flower-stalks axillary, short, each bearing about four elegant

drooping flowers, about an inch and a half long. Calyx swelling, purplish-red, contracted at the mouth, quite entire. Corolla with a pale yellowish tube, and crimson, spreading or reflexed, border, whose segments are rounded, and nearly uniform, the lowermost only a little the largest, and folding over the mouth like a lid, before the flower expands. Berry globose, as big as a small apple, with a brown brittle coat. Swartz once found a fruit with three cells.

2. *T. Jaroba*. Three-leaved Tanæcium. Willd. n. 2. Swartz Ind. Occ. 1050. t. 20. f. 1. (Jaroba; Marcgr. Brasil. 25. Pis. Brasil. 173. Cucurbitifera fruticosa trifolia scandens; Sloane Jam. v. 2. 175.)—Lower leaves ternate; upper in pairs, with an intermediate terminal tendril. Stem climbing.—Native of woods, on the banks of rivers, in the western part of Jamaica. Swartz found it in flower in February, climbing to the top of a tree of the *Bignonia leucoxylo*. The shrubby stem mounts to a great height, where it has an opportunity of support, sending out long, pendulous, round, slightly striated, herbaceous branches. Leaves opposite, stalked; the lower ones with three ovate, pointed, entire, ribbed, smooth, scarcely coriaceous, leaflets, each half a foot long; upper of two rather smaller ones, with a slender rigid tendril in the place of a third leaflet, by which the branches are supported on those of neighbouring trees. Clusters axillary, of few flowers, with thick, round, opposite stalks. Flowers white, short-lived. Calyx gibbous at the base; sometimes very minutely five-toothed at the margin. Corolla funnel-shaped; its tube six or seven inches long, swelling at the top, downy both within and without; segments of the limb ovate, wavy or plaited, about three-quarters of an inch in length, all nearly equal, though the two uppermost are, as in the former species, less deeply separated. Berry very large, a foot long, oval, pendulous, smooth, brittle when ripe. Seeds large, broad, compressed, lying closely over each other. The Portuguese call this plant *Casca amargosa*, on account of its bitterness.

3. *T. pinnatum*. Pinnate Tanæcium. Willd. n. 3. (*Crescentia pinnata*; Jacq. Coll. v. 3. 203. t. 18.)—Leaves pinnate. Stem arboreous, erect.—Native of Mozambique, where it is called *Kigelikieia*, and from whence it was carried to the isles of Mauritius or Bourbon, and thus got into the imperial gardens at Schoenbrunn, being accompanied by a dissected drawing of the flower, which is all that Jacquin has exhibited of the plant. The young tree, about seven feet high, and four inches in the diameter of its trunk, bore in the above several branches, with alternate pinnate leaves, each of four pair of oblong leaflets with an odd one, all coriaceous, obtuse with a point, undulated, sparingly and sharply serrated; smooth above; roughish to the touch beneath; the largest near six inches long; the odd one on a considerable partial stalk. The flowers are said to grow on the trunk and older branches, but of their mode of insertion or inflorescence we have no account. The calyx is ovate, tubular, smooth, paleish-green, about an inch long, with five acute, rather deep, red segments. Tube of the corolla cylindrical, pale, the length of the calyx; limb very large, bell-shaped, three inches long, with five acute, unequal, reflexed, marginal lobes; its outside strongly and copiously ribbed, pale, with a tinge of red; the whole inside of a fine crimson. The fifth stamen is apparently perfect, with an anther, though but half the length of the others; all the filaments hairy. Germen accompanied at the base by five glands. Stigma of two lanceolate plates. Berry as large as a man's head, coated, full of pulp, in which the seeds are lodged.—Jacquin was doubtful of the genus of this magnificent

ficent and curious plant, which is said to form, in its native country, a very large tree. There seems as much reason to refer it to *Crescentia* as to *Tanacium*, the calyx not answering well to either, and the internal structure of the fruit being unknown.

**TANAEIM**, or **TENAIEM**, in *Geography*, a town of Arabia, in the province of Yemen, famous among the Arabian Jews, who had anciently their chief feat, and many considerable synagogues in it; at present it is almost desolate; 30 miles S.E. of Sana.

**TANAGA**, one of the Fox islands, in the North Pacific ocean, about 40 miles in circumference. N. lat.  $53^{\circ} 20'$ . E. long.  $182^{\circ} 14'$ .

**TANAGER**, *Il fiume Negro*, in *Ancient Geography*, a river of Italy, in Lucania, according to Virgil. It has its source in a mountain called Albusinus, now monte Postiglione, and discharges itself into the Silanus.

**TANAGRA**, a considerable town of Bœotia, towards the west, seated on an eminence, at some distance from the mouth of the Asopus. In a temple of Bacchus at this town was a fine statue of this god, and above, a triton of admirable workmanship. Besides the temple of Bacchus, here were temples of Themis, Venus, Apollo, and Mercury. In the most conspicuous place of this city was the tomb of Corinna, so famous for her beauty and poetical talents, so that at Thebes she gained a prize in preference of Pindar. Here was also the tomb of Orion. Pausanias.

**TANAGRA**, *Tanager*, in *Ornithology*, a genus of the order Passeres; the characters of which are, that the bill is conic, acuminate, emarginated, subtrigonal at the base, and inclining at the apex. Gmelin enumerates forty-six

Species.

**JACAPA**. Black; the forehead, neck, and breast, crimson-coloured. This is the jacapu of Marcgrave, the red-breasted blackbird of Edwards, and the red-breasted tanager of Latham. It is found in America.

**BRASILIA**. Crimson, with black tail and wings. This is the cardinal of Buffon, and the Brazilian tanager of Latham. Found in South America. Of this bird there are two varieties, one of which is the rumpless blue, red, and black Indian sparrow of Willughby.

**RUBRA**. Red, with black wings and tail, and tail-feathers white at the apex. This is the Canada tanager of Pennant, and the red tanager of Latham. Found in Canada. Of this the scarlet sparrow of Edwards, or merula brasiliensis of Ray and Willughby, is a variety.

**JACARINA**. Violet-black, with wings whitish beneath, and tail of two divaricated branches. This is a bird of Brasil and Guiana, the jacarini of Marcgrave.

**VIOLACEA**. Violet, and the under part very yellow: the teitei of Marcgrave, the golden titmouse of Edwards, and golden tanager of Latham. A variety of this, found in Brasil, Surinam, and Cayenne, is shining black, with the abdomen, breast, and front pale yellow, and the outer tail-feather having on its inner side a white spot.

**OLIVACEA**. Olive; the throat and breast yellow, the abdomen white, the quills and tail-feathers brown, with a white margin. This is the olivet of Buffon, and found in Cayenne.

**GYROLA**. Green, red-headed, yellow collar, and ceruleous breast: the rouvardin of Buffon, the red-headed greenfinch of Edwards, and red-headed tanager of Latham. Found in various parts of South America.

**CAYANA**. Yellow, green back, red cap, and black cheeks. A bird of Cayenne, of which there is a variety,

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underneath golden-coloured, back green and yellow, head ceruleous, wings and tail green.

**ATRATA**. Shining black: the black tanager of Latham. Found in India.

**MEXICANA**. Black, underneath yellowish, breast and rump blueish: the black and blue titmouse of Edwards, and black and blue tanager of Latham. The tangara barbadensis cerulea of Brisson is a variety. Found in Cayenne, Guiana, and New Spain.

**TATAO**. Violet, black back, yellow rump, green head, and violet breast and wings: the titmouse of paradise of Edwards, the paradise tanager of Latham, and the tangara of Brisson, Ray, Willughby, and Buffon. Found in Guiana.

**ALBROSTRIS**. Black, with a spot on the wings, and tail yellow, and a white beak: the white-billed tanager of Latham. Of this there is a variety. It is an American bird.

**GULARIS**. Black, beneath white, red head, and purple throat: the rouge-cap of Buffon, and red-headed tanager of Latham. Found in Cayenne and Guiana.

**CAYENNENSIS**. Black, both sides of the breast and under part of the wings yellow. Found in Brasil, Guiana, and New Spain.

**BRASILIENSIS**. Black, under part white, throat and rump blueish, face and breast black: the guira-genoia of Marcgrave, the turquin of Buffon, and turquoise tanager of Latham. A Brasil species.

**DOMINICA**. Black-spotted, above brown, and below whitish: called from the place of its residence, by Latham, the St. Domingo tanager.

**MILITARIS**. Brown; breast, neck, throat, and shoulders sanguineous: the military tanager of Latham, and greater bulfinch of Edwards. Found in South America.

**GRISEA**. Grey-olive, under grey, with wings and tail black, grey at their margin. Found in Guiana and Louisiana.

**EPISCOPUS**. Cinereous, with wings and tail externally blueish: the bishop tanager of Latham. Found in Cayenne.

**SAYACA**. Hoary, with blueish wings: the fayacu of Marcgrave. Found rarely in Cayenne.

**PUNCTATA**. Green, pointed with black; under yellowish-whitish: the fyacoa of Buffon, spotted green titmouse of Edwards, and spotted tanager of Latham. Found in Cayenne.

**VIRENS**. Green, under yellowish, cheeks and throat black: the green tanager of Latham. Found in New Spain, Peru, and Brasil.

**MISSISSIPENSIS**. Wholly red: the Mississippi tanager of Latham. Of this species there are two varieties; one found on the river Mississippi, and the other in New Spain.

**CRISTATA**. Blackish, golden crest, throat and rump yellow: the houpette of Buffon, and crested tanager of Latham. Found in Guiana.

**ÆSTIVA**. Red, bill yellowish: the summer red-bird of Catesby and Edwards, and summer tanager of Pennant and Latham. Found in Carolina and Virginia.

**MAGNA**. Olive-brown; under reddish; legs, front, and temples blueish; vent-feathers and throat red, and the middle of the throat white: the grand tanager of Latham. Found in Guiana and Cayenne.

**CÆRULEA**. Blueish, black bill, and light-red legs: the blue tanager of Latham. A Cayenne bird.

**VARIABILIS**. Green, partly blueish and partly brown, black band about the eye, quills and tail-feathers black, with green margins: variable tanager of Latham.

K

TRICOLOR.

**TRICOLOR.** Green; head, chin, throat, and breast pale sea-colour; black neck-band, head and sides of the neck golden-green, a large spot on the throat, and back black, the breast-band blueish, the abdomen and vent-feathers yellowish-green: the green-headed tanager of Latham. Of this there is a variety.

**GUIANENSIS.** Green, head cinereous-grey, front and head-band on both sides from the front to the nape red: the grey-headed tanager of Latham. Found rarely in the forests of Guiana.

**NIGRICOLLIS.** Olive, beneath yellow, black throat, golden breast, feathers of the wings and tail-feathers brown, with olivaceous margins: the black-throated tanager. Found in Guiana.

**RUFICOLLIS.** Black and blue, with a large red streak on the throat, and black wings and tail: the rufous-throated tanager of Latham. Found in Jamaica.

**LEUCOCEPHALA.** Black and brown, white front, reddish throat, purple breast and wings, and yellowish abdomen and vent-feathers: the quatoztli of Seba. Found in the mountains of Brazil.

**FLAVA.** Yellow throat, breast and spots of the abdomen black, quills and tail-feathers black, sea-coloured at the margin. This is the guirapera of Ray and Willughby, and the yellow tanager of Latham. Found in Brazil, of the size of a lark.

**AMBOINENSIS.** Varied with black and blue, black vertex, blueish-green rump; cheeks, chin, throat, and breast blueish; abdomen and vent-feathers white. Found in Amboina, and called calatti.

**CANORA.** Blueish, varied with yellow; black tail, white at the apex; and wings partly blueish and partly yellow: the xiuhtototl of Fernandez. Found in New Spain.

**SINENSIS.** Olivaceous, beneath yellow, with the quills and tail-feathers black, yellow at their margin: the Chinese tanager of Latham.

**BONARIENSIS.** Black and violet, with a slight greenish tint in the wings and tail: the violet tanager of Latham.

**ATRA.** Cinereous, with the face, chin, and throat black, (those of the female yellow:) the camail or cravatte of Buffon, and black-faced tanager of Latham. Found in Guiana.

**PLEVA.** Blueish-cinereous, beneath silvery, with the vertex, temples, and sides of the neck black, and the ocular spot white; the hooded tanager of Latham. Of this the tripiranga of Ray and Willughby is a variety. Found in Guiana and Brazil.

**MELANOTERA.** Above ferruginous, beneath very yellow, head and nape black, wings streaked with white, and tail brown: the black-crowned tanager of Latham. Found on the Caucasus and in Georgia.

**SIBIRICA.** Black, the tips of the down between the shoulders and the rump edged with white. A Siberian species.

**ATRICAPILLA.** Reddish and rufous; head, tail, and wings shining black, with a roundish tail: the mordoré of Buffon, and black-headed tanager of Latham. Found in Guiana.

**STRIGATA.** Beneath yellow, with a head striated with black and blue, back above blackish and beneath golden, quills and tail-feathers black, with a blue margin: the onget of Buffon, and farrow-clawed tanager of Latham. Found in South America.

**NIGERRIMA.** Black, with a white spot within the wings: the Guiana tanager of Latham.

**CAPESSIS.** Above ferruginous-brown, beneath ferru-

ginous, varied with white; the middle of the tail black, its sides ferruginous-rufescent, the bill yellowish, the legs black. Found at the Cape of Good Hope.

**TANAH,** in *Geography.* See **SAN.**

**TANAIS,** the *Don,* in *Ancient Geography,* a large river which had its rise towards the east, in the territory of the Thyrsagetes, traversed the country of the Sarmatians, turned its course to the south, and discharged itself in the lake of Mæotis. Its course was so rapid, that it never froze. Its borders were inhabited by the Sarmatians. The two mouths of the Tanais were distant 70 stadia from one another, according to Strabo.—Also, a town of European Sarmatia, situated between the mouths of the river of the same name.—Also, a river of Africa, which ran into the Mediterranean, towards the south-west, at five miles from Thena.

**TANAIS,** in *Mythology,* a divinity peculiar to the Armenians, to whom were consecrated the slaves of both sexes; and it is also said, that the people of better rank offered to him their daughters, who, as soon as they were consecrated to this god, were authorized by the law to prostitute themselves to the first comer, until the time of their marriage. Nor did this conduct by any means prevent the addresses of suitors.

**TANAK POINT,** in *Geography,* a cape on the north coast of Java. S. lat.  $6^{\circ} 24'$ . E. long.  $108^{\circ} 36'$ .

**TANAKAKA,** a small island near the south-west coast of Celebes, belonging to the Dutch. S. lat.  $5^{\circ} 30'$ . E. long.  $119^{\circ} 42'$ .

**TANALITZKAJA,** a fortress of Russia, in the government of Upha, at the conflux of the Urdasim and Ural; 120 miles E. of Orenburg.

**TANAMBE,** a town on the east coast of Madagascar. S. lat.  $16^{\circ} 20'$ . E. long.  $50^{\circ} 20'$ .

**TANAON,** a town on the east coast of the island of Leyta. N. lat.  $11^{\circ} 10'$ . E. long.  $125^{\circ} 1'$ .

**TANAOSIMA,** one of the Japanese islands, about 100 miles in circumference. N. lat.  $30^{\circ} 20'$ . E. long.  $132^{\circ} 30'$ .

**TANARGUE,** a mountain of France, which gives name to a district in the department of the Ardèche; 20 miles S.W. of Privas.

**TANARO,** one of the six departments of Piedmont, for its union with the French republic, August 26, 1802, formerly Acqui and Asti, in N. lat.  $44^{\circ} 45'$ , west of Marengo, containing 197 square leagues, and 311,458 inhabitants. It was divided into three circles, viz. Asti, including 131,910; Acqui, 82,914; and Alba, 96,634 inhabitants. The soil is broken by torrents, which form many lakes and marshes. The south-west district consists of barren spots and fruitful vallies; the northern part is fertile, and the hills yield abundance of wine of an inferior quality. The principal products of the department are grain, fruits, and pastures, with quarries of stone, mineral springs, &c.

**TANARO,** a river of France, which rises in the mountains near Tenda, passes by Coni, Cherasco, Alba, Asti, Alexandria, &c. and joins the Po, 3 miles E. of Valenza.

**TANARUS,** the *Tanaro,* in *Ancient Geography,* a river of Italy, in Liguria, which having been formed by the confluence of many rivers, discharged itself into the Padus, north-west of Dertona.

**TANASSERIM,** in *Geography.* See **SIAM.**

**TANAVELLE,** a town of France, in the department of the Cantal; 4 miles W.S.W. of St. Flour.

**TANAW,** a town of Nepal; 45 miles S.W. of Catmandu.

**TANBAY,**

TANBAY, a town on the E. coast of the island of Negros. N. lat.  $10^{\circ} 3'$ . E. long.  $123^{\circ} 1'$ .

TANCACA, a town of Mexico, in the province of Guafteca; 50 miles W.S.W. of St. Yago de los Valles.

TANCALE, a town of Mexico, in the province of Guafteca; 50 miles N.W. of St. Yago de los Valles.

TANCANCHY, a town of Hindoostan, in Madura; 8 miles S. of Vadagary.

TANCARVILLE, a town of France, in the department of the Lower Seine; 10 miles S.E. of Montevilliers.

TANCHOY, a town of Mexico, in the province of Guafteca; 35 miles N. of Panuco.

TANCICUY, a town of Mexico, in the province of Guafteca; 15 miles S.W. of Panuco.

TANCOA, a town of Abyssinia; 40 miles N.N.E. of Miné.

TANCOBANCA, a river of Persia, which runs into the sea, 69 miles W.N.W. of Port Jaques.

TANCOS, a town of Portugal, in Estremadura, at the conflux of the Zezare and the Tagus; 21 miles N.E. of Santarem.

TANCUYLABO, a town of Mexico, in the province of Guafteca; 30 miles S.S.E. of St. Yago de los Valles.

TANCYTOWN, a post-town of Maryland; 27 miles N.E. of Frederickstown.

TANDA, a town on the east coast of the island of Mindanao. N. lat.  $8^{\circ} 48'$ . E. long.  $126^{\circ} 12'$ .

TANDA, or *Tanrah*, a town of Hindoostan, called sometimes *Chawaspour Tanda*, from the original name of the district in which it was situated. It was a short time, in the reign of Shere Shaw, about the year 1540, the capital of Bengal, and became the established capital under Acbar, about 1580. It is situated very near to the site of Gour, on the road leading from it to Rajemal. There is little remaining of this place, save the rampart; nor do we know for certain when it was deserted. In 1659 it was the capital of Bengal, when that subah was reduced under Aurungzebe.

TANDAH, a town of Bengal; 12 miles S.E. of Calcutta.

TANDAM, a town of Bootan; 57 miles N. of Dinagepour.

TANDAMORGONG, a town of Hindoostan, in Goonđwanah; 25 miles E. of Nagpour.

TANDEGO, a town of Africa, on the St. Domingo river; 25 miles E. of Farim.

TANDERAGEE, a post-town of the county of Armagh, Ireland, which has a good linen market. It is near the Newry canal, and 61 miles N. by W. from Dublin.

TANDLA, a town of Hindoostan, in Malwa; 72 miles W. of Ougein. N. lat.  $23^{\circ} 5'$ . E. long.  $74^{\circ} 30'$ .

TANDOO BAAS, a small island in the Sooloo Archipelago. N. lat.  $5^{\circ} 8'$ . E. long.  $120^{\circ} 15'$ .

TANDOO Battoo, a small island in the Sooloo Archipelago. N. lat.  $5^{\circ} 9'$ . E. long.  $120^{\circ} 12'$ .

TANDORF, a town of Bohemia, in the circle of Koniggratz; 20 miles E. of Koniggratz.

TANE, a river of Finmark, which runs into the Frozen sea, N. lat.  $70^{\circ} 48'$ .

TANE. See TAROATAHETOOMO.

TANG, in *Geography*, a town of Sweden, in West Gothland; 30 miles E.N.E. of Uddevalla.

TANGA, in *Commerce*, a money of account at Goa, in the East Indies; some of which are good, and others bad. A pardo is worth 4 good tangas or 5 bad; 16 good vintins, or 20 bad, are equal to 300 good bafaruccos, or 360 bad. The coins are the St. Thomas, a gold piece of money of

nearly the weight of a ducat, which passes for 11 good tangas, more or less. The silver coins are the pardo xeraphin of 5 good tangas, and the common pardo of 4 good tangas. The copper and tin coins are the good and bad bafaruccos. Venetian sequins are worth 16 good tangas; pagodas, 10 good tangas; and Spanish dollars, 550 good bafaruccos, all more or less. A good tanga is worth about  $7\frac{1}{2}d$  sterling; a pardo,  $2s. 6d.$ ; and a xeraphin,  $3s. 3\frac{1}{2}d.$  sterling nearly. Kelly's Cambiil.

TANGALA, in *Geography*, a small island in the East Indian sea, near the S. coast of Java. S. lat.  $8^{\circ} 20'$ . E. long.  $111^{\circ} 45'$ .

TANGALE, a town of the island of Ceylon; 92 miles S. of Candy.

TANGARAC, in *Botany*, a poisonous Brazilian plant; but the root, says Piso, is an antidote to the leaves, flowers, and fruit. Boyle's Works, Abr. vol. i. p. 14.

TANGAWA, in *Geography*, a town of Japan, in the island of Ximo; 30 miles S.E. of Kokura.

TANGE, a town of Sweden, in West Gothland; 21 miles N. of Gotheburg.

TANGEN, a town of Norway, in the province of Aggerhuus; 2 miles E. of Stromsoe.

TANGENE, a town of Sweden, in West Gothland; 26 miles E. of Uddevalla.

TANGENT, in *Geometry*, a right line which touches a circle, that is, meets it in such manner, as that, though infinitely produced, it would never cut the same; that is, never come within the circumference.

Thus the line AD (*Plate XV. Geometry, fig. 3.*) is a tangent to the circle in D.

It is demonstrated in geometry; 1. That if a tangent, AD, and a secant, AB, be both drawn from the same point, A; the square of the tangent will be equal to the rectangle, under the whole secant AB, and that portion of it, AC, which falls without the circle.

2. That if two tangents, AD, AE, be drawn to the same circle from the same point A, they will be equal to each other.

As a right line is the tangent of a circle, when it touches the circle so closely, that no right line can be drawn through the point of contact between it and the arc, or within the angle of contact that is formed by them; so in general, when any right line touches any arc of a curve, in such a manner that no right line can be drawn through the point of contact, betwixt the right line and the arc, or within the angle of contact that is formed by them, then is that line the tangent of the curve at the said point.

The tangent of an arc is the right line that admits the position of all the secants that can pass through the point of contact, though, strictly speaking, it is no secant. Macl. Flux. art. 181. 505.

TANGENT, in *Trigonometry*.—A tangent of an arc is a right line, raised perpendicularly on the extreme of the diameter, and continued to a point, where it is cut by a secant, that is, by a line drawn from the centre through the extremity of the arc of which it is a tangent.

A tangent of an arc A (*Plate II. Trigonom. fig. 13.*) is a part of a tangent of a circle (that is, of a right line, which touches a circle without cutting it), intercepted between two right lines drawn from the centre C, through the extremes of the arc E and A.

Hence the tangent FE is perpendicular to the radius EC.

And hence the tangent FE is the tangent of the angle ACE, as also of that of ACI; so that two adjacent angles have only the same common tangent.

# TANGENT.

TANGENT, *Co*, or *Tangent of the Complement*, is the tangent of an arc, which is the complement of another arc to a quadrant.

Thus a tangent of the arc  $AH$ , is the co-tangent of the arc  $AE$ , or the tangent of the complement of the arc  $AE$ .

To find the length of the tangent of any arc, the sine of the arc being given: suppose the arc  $AE$ , the given sine  $AD$ , and the tangent required  $EF$ . Since both the sine and tangent are perpendicular to the radius  $EC$ , they are parallel to each other. Wherefore as the cosine  $DC$  is to the sine  $AD$ , so is the whole sine to the tangent  $EF$ . See *SINE*.

Hence, a canon of sines being had, a canon of tangents is easily constructed from it.

TANGENTS, *Artificial*, are the logarithms of the tangents of arcs.

TANGENTS, *Line of*, is a line usually placed on the sector, and Gunter's scale; the description and uses of which, see under *SECTOR*.

TANGENT of a *Conic Section*, as of a parabola, is a right line, which only touches or meets the curve in one point, and does not cut or enter within the curve. See *CONIC SECTIONS*.

TANGENTS, *Method of*, is a method of drawing tangents to any algebraical curve, or of determining the magnitude of the tangent and sub-tangent, the equation to the curve being given.

The method of tangents is nearly related to that of *maxima et minima*; and the same authors, who in the early state of algebra attempted one of those cases, never failed of touching also on the other. Hence we have the methods of Descartes, Fermat, Roberval, Hudde, &c. We have already explained under the article *MAXIMA et MINIMA*, the several methods of these authors relating to the latter subject; and as their methods of tangents differ in no respect from this, we shall not repeat them again in this place, but merely explain the principle which led to so intimate a connection between the two problems.

*Descartes' Method of Tangents.*—It has been shewn under the article above referred to, that Descartes' method of maxima and minima, depended upon his making two roots of his equation equal to each other, and the same principle led him also to his problem of tangents.

Let us conceive, for example, a curve  $ABb$ , (*Plate XIV. Analysis, fig. 16.*) described on an axis  $AC$ ; and from any point in this axis,  $C$ , as a centre, let there be described a circle, which shall cut the curve at least in two points, as  $B, b$ ; from these draw two ordinates, which will necessarily be common both to the circle and curve; let us now imagine the radius of this circle to decrease, while its centre remains fixed; and it is obvious that thus the two points of intersection will approach each other, and finally coincide, in which case the circle will touch the curve at the point  $E$ , and the tangent at that point will be common to both, and perpendicular to the radius of the circle at that point. Thus the problem of determining the tangent to a curve, is reduced to finding the position of a perpendicular to the curve, drawn from any point in its axis. In order to effect this, Descartes sought, in a general manner, the points of intersection in the curve made by a circle described with a given radius from a given point in the axis. He thus arrived at an equation, which, in the case of two intersections, ought to contain two unequal roots, expressing the distance of the two ordinates from the vertex of the curve. But when the two points of intersection are united in one, as in the case of the circle touching the curve, then the two roots of the equation are necessarily equal to each other. His object, therefore, was, in the equation first obtained, and of

which the co-efficients were indeterminate, to give them such values, that the two roots should be equal; for which purpose, he compared the proposed equation with an equation of the same degree, having two equal roots; and hence, by equating the co-efficients, obtained the value of those in his first equation.

In order to illustrate this, let  $ABb$  (*fig. 16.*) be a parabola, and  $Bb$  a circle. Make  $CA = a$ ,  $AD = x$ , the radius  $CB = r$ , then  $CD = a - x$ ; and since the ordinate  $BD$  belongs to the circle, we have

$$y^2 = r^2 - CD^2 = r^2 - (a - x)^2 = r^2 - a^2 + 2ax - x^2.$$

But the same ordinate belonging also to the parabola, we have from the known property of that curve,  $y^2 = px$ ,  $p$  being the parameter; therefore

$$\begin{aligned} r^2 - a^2 + 2ax - x^2 &= px, \text{ or} \\ x^2 + (p - 2a)x + (a^2 - r^2) &= 0, \end{aligned}$$

which, being an equation of the second degree, must necessarily have two roots, or values, of  $x$ , answering to the two abscissas  $AD, Ad$ : for we should arrive at the same conclusion, if our equation had been deduced with reference to the point  $b$ ; and it is obvious that these roots depend entirely upon the relation of the co-efficients  $(p - 2a)$  and  $(a^2 - r^2)$ , or upon the ratio of the quantities  $a, p$ , and  $r$ , to each other; and, consequently, such values may be given to these quantities, that the two values of  $x$  may be equal.

In order to find this ratio, Descartes formed an equation of the second degree, having two equal roots, as  $x^2 - 2ex + e^2 = 0$ , viz.  $(x - e)(x - e) = 0$ ; and comparing this with that found above, he obtained the equation  $x - a = CD = \frac{1}{2}p$ , which shews that in the parabola, the sub-normal is equal to half the parameter; whence it also follows, that the sub-tangent is equal to double the absciss, which is the known property of the curve.

Descartes had also another method for tangents, a little different from the above in practice, although it was the same in principle; thus he conceived a right line to revolve about a fixed point in the axis of the curve produced, which at first should cut the curve in a certain number of points, but by its revolution, these points of intersection approaching each other would finally coincide, and thus the revolving line become a tangent to the curve. For this purpose he also first obtained the general equation, which he afterwards equated with another having two equal roots, and thus determined the several relations of his indeterminate co-efficients, exactly as in the case above given.

*Fermat's Method of Tangents.*—It will be found by comparing the above method of tangents of Descartes, with that of his maxima and minima, that the two ultimately depend upon the same principle, viz. of making two roots of an equation equal to each other; and the coincidence of Fermat's methods for these two problems is still more obvious; in fact, he scarcely treats of them as distinct cases, but refers immediately for the solution of the case of tangents to that of his maxima and minima. In order, says this author, that a line may be a tangent to a curve, as for example to the parabola  $ABb$ , at the point  $b$ , (*fig. 17.*) it is evident that every ordinate, except  $BC$ , will meet that tangent beyond the curve, as in  $C$ . Thus the ratio of  $BC^2 : ce^2$ , which is the same as  $CD^2 : cD^2$ , will be less than that of  $CB^2 : cb^2$ , or than that of  $CA$  to  $cA$ ; but if we suppose these ratios to be the same, and consequently the distance  $cC$  to vanish, the points  $B, b$ , will coincide, and we shall have an equation, which, treated in the same manner as in his method of *de maximis et minimis*, will give the ratio of  $CD : CA$ .

# TANGENT.

As to the methods propofed by Hudde, Roberval, Huygens, &c. they differ from thofe given above, only in the fame manner as in their methods of maxima and minima; it would therefore be ufelefs to describe them in this place.

*Barrow's Method of Tangents.*—It is obvious from what is faid above, and what has been ftated under the article *MAXIMA et MINIMA*, that both the method of tangents, and that for the greateft and leaft ordinates, were very nearly related to the preft fluxional way of treating the fame fubjects; but with regard to tangents, a ftill nearer approach was made by Dr. Barrow.

This accurate geometer confidered the little triangle formed by the difference of the two ordinates, their diftance from each other, and the indefinitely fmall part of the curve, as fimilar to that which is formed by the ordinate, the tangent, and fub-tangent. He then fought by the equation of the curve, the ratio of the two fides  $ba$ ,  $Ba$ , (*fig.* 18.) of the triangle  $Bba$ , when the difference of the ordinates is infinitely little; and then faid, as  $ba : Ba ::$  ordinate  $Bp$  : the fub-tangent  $Tp$ .

In the cafe of the parabola, for example, whole equation is  $y^2 = px$ ; fupposing  $Pp$  the increafe of the abfcifs  $= e$ , and  $ba$  the corresponding increafe of the ordinate  $y = a$ ; then the equation for the ordinate  $pb$  becomes

$$(y + a)^2 = p(x + e), \text{ or}$$

$$y^2 + 2ay + a^2 = px + pe.$$

Subtracting from both fides  $y^2 = px$ , there remains

$$2ay + a^2 = pe.$$

Alfo  $a$  being itfelf infinitely fmall, its fquare  $a^2$  may be entirely neglected, and there refults  $2ay = pe$ ; therefore  $a : e :: p : 2y$ ; but  $a = ba$ , and  $e = Ba$ , alfo  $y = \sqrt{px}$ ; therefore, from the propofition ftated above, *viz.*

$$ab : aB :: \text{ordinate} : \text{fub-tangent},$$

we have

$$p : 2\sqrt{px} :: \sqrt{px} : 2x, \text{ the fub-tangent required.}$$

Such were the principles employed in the folution of this interefting problem prior to the brilliant difcovery of the fluxional calculus, which from its generality fupplanted them all, and they are now therefore merely matters of hiftorical curiofity; but as they exhibit the flow and progrefive advances of genius and fcience towards an ultimate ftate of perfection, they are highly deferving of the attention of the mathematician, who will find in them much to admire; they will at the fame time enable him duly to appreciate the tranfcendant talents of that great philofopher, who formed out of them one general and comprehensive principle of folution, which will apply with equal facility to algebraical curves of every order.

*The Method of Tangents according to the Doctrin of Fluxions.*—Its ufe is very great in *Geometry*; becaufe in determining the tangents of curves, we determine at the fame time the quadrature of the curvilinear fpaces: on which account it well deferves to be here particularly infifted on.

*To find the Sub-tangent in any algebraic Curve.*—Let the propofed curve be  $AMO$  (*Plate XIV. Anal. fig.* 19.), and the right line  $TMQ$  a tangent to it at the point  $M$ ; let the femiordinate  $pM$  be infinitely near another  $PM$ , and  $MR$  parallel to  $AH$ ; then the relative celerities of the point  $M$ , moving along the curve from  $A$  towards  $O$ , in the direCTIONS  $MR$  and  $PM$ , with which  $AP$  and  $PM$  increafe in this pofition, will be truly expreffed by  $MR$  and  $Rm$ ; but the celerities by which quantities increafe are as the fluxions of thofe quantities; therefore ( $Mm$  being the fluxion of the curve line  $AM$ )  $MR$  and  $Rm$  are the corresponding

fluxions of the abfcifs  $AP$ , and the ordinate  $PM$ ; and, becaufe the triangles  $MmR$  and  $TMP$  are fimilar, we have  $Rm : MR :: PM : PT$ . Let, therefore, the abfcifs  $AP$  be put  $= x$ , and the ordinate  $PM = y$ , and we fhall have

$$y : \dot{x} :: y : \frac{y \dot{x}}{y} = PT. \text{ By means of this general expref-}$$

tion for the fub-tangent, and the equation of the curve expreffing the relation between  $x$  and  $y$ , the ratio of the fluxions  $\dot{x}$  and  $\dot{y}$  will be found, and from thence the length of the fub-tangent; whence the tangent itfelf may be eafily determined and drawn. This we fhall illuftrate in the following examples:

I. The equation defining a circle is  $ax - xx = y^2$ ; and by taking the fluxions of thefe quantities,  $a\dot{x} - 2x\dot{x} =$

$$2y\dot{y}; \text{ confequently } \frac{\dot{x}}{\dot{y}} = \frac{2y}{a - 2x} = \frac{y}{\frac{1}{2}a - x}; \text{ and, multi-}$$

plying both fides by  $y$ , we have  $\frac{y \dot{x}}{\dot{y}} = \frac{y^2}{\frac{1}{2}a - x} =$  the fub-

tangent  $PT$  (*fee fig.* 20.); whence  $(\frac{1}{2}a - x)$ , or  $AC - AF$ , *i.e.*  $CP : (y) PM :: (y) PM : PT$ ; a property of the circle deduced from the principles of common geometry.

II. The equation defining the common parabola is  $ax = y^2$ ,  $a$  being the parameter,  $x$  the abfcifs, and  $y$  the or-

dinate; hence  $a\dot{x} = 2y\dot{y}$ , and  $\frac{\dot{x}}{\dot{y}} = \frac{2y}{a}$ ; confequently,

$$\frac{y \dot{x}}{\dot{y}} = \frac{2y^2}{a} = \frac{2ax}{a} = 2x; \text{ therefore the fub-tangent } PT$$

(*fig.* 19.) is the double of its correponding abfcifs  $AP$ ; which is a well-known property of the parabola.

III. The general equation for parabolas of any kind

being  $a^m x^n = y^{m+n}$ ; we have  $n a^m x^{n-1} \dot{x} = \overline{m+n} \times$

$$y^{m+n-1} \dot{y}; \text{ and, therefore, } \frac{\dot{x}}{\dot{y}} = \frac{\overline{m+n} \times y^{m+n-1}}{n a^m x^{n-1}}; \text{ whence}$$

$$\frac{y \dot{x}}{\dot{y}} = \frac{\overline{m+n} \times y^{m+n}}{n a^m x^{n-1}} = \frac{\overline{m+n} \times a^m x^n}{n a^m x^{n-1}} \text{ (becaufe } y^{m+n} = a^m x^n)$$

$$= \frac{\overline{m+n}}{n} \times x = \text{the true value of the fub-tangent; which,}$$

therefore, is to the abfcifs in the conftant ratio of  $\overline{m+n}$  to  $n$ .

IV. The equation defining an ellipfis is  $b^2 \times ax - x^2 = a^2 y^2$ ,  $AP$  (*fig.* 21.) being  $= x$ ,  $MP = y$ ,  $AB = a$ , and the leffer axis  $= b$ ; for by the property of the ellipfis, we have  $a^2 : b^2 :: ax - x^2 (AP \times PB) : y^2 (MP^2)$ ;

and, therefore,  $b^2 \times ax - x^2 = a^2 y^2$ ; whence  $b^2 \times$

$$\overline{ax - 2x\dot{x}} = 2a^2 y\dot{y}, \text{ and } \frac{\dot{x}}{\dot{y}} = \frac{2a^2 y}{b^2 \times a - 2x}; \text{ and, con-}$$

$$\text{fequently, the fub-tangent } PT \left( \frac{y \dot{x}}{\dot{y}} \right) = \frac{2a^2 y^2}{b^2 \times a - 2x} =$$

$$\frac{a^2 y^2}{b^2 \times \frac{1}{2}a - x} = \frac{b^2 \times \overline{ax - x^2}}{b^2 \times \frac{1}{2}a - x} = \frac{ax - x^2}{\frac{1}{2}a - x}; \text{ whence the point}$$

$T$  being given, through which the tangent muft pafs, the tangent itfelf may be drawn.

V. Becaufe the equation, exhibiting the nature of all kinds

# TANGENT.

kinds of ellipses, (putting  $a$  and  $c$  for the two principal diameters) is  $\sqrt{a-x} \times x^n = \frac{c}{a} \times y^{m+n}$ , we shall

have  $-m \sqrt{a-x} \times x^{n-1} \times x^n + n x^n \times \sqrt{a-x} = \frac{c}{a}$

$\times m + n \times y^{m+n-1}$ ; and, therefore,  $\frac{y \dot{x}}{\dot{y}} =$

$$\frac{\frac{c}{a} \times m + n \times y^{m+n-1}}{-m \times \sqrt{a-x} \times x^{n-1} \times x^n + n x^n \times \sqrt{a-x}} =$$

$$\frac{m + n \times \sqrt{a-x} \times x^n}{-m x^n \times \sqrt{a-x} + n x^n \times \sqrt{a-x}} \quad (\text{because } \frac{c}{a} \times$$

$$y^{m+n} = \sqrt{a-x} \times x^n) = \frac{m + n \times \sqrt{a-x} \times x^n}{-m x^n \sqrt{a-x} + n x^n \sqrt{a-x}} = \frac{m + n \times \sqrt{a-x} \times x^n}{n a - n + m \times x}$$

= the subtangent required.

VI. The equation defining the hyperbola is  $c \times a x + x^2 = a y$ ,  $a$  and  $c$  being used to denote the two principal diameters; whence we have,  $c \times a \dot{x} + 2 x \dot{x} a$

$= 2 a \dot{y}$ ; consequently  $\frac{\dot{x}}{\dot{y}} = \frac{a y}{c \times \frac{1}{2} a + x}$ ; and  $\frac{y \dot{x}}{\dot{y}} =$

$$\frac{a y^2}{c \times \frac{1}{2} a + x} = \frac{c \times a x + x^2}{c \times \frac{1}{2} a + x} = \frac{a x + x}{\frac{1}{2} a + x} = \text{the subtangent;}$$

whence the distance of the point of intersection of the tangent and axis from the vertex, which is equal to the difference of the sub-tangent and absciss, may be found;

for  $\frac{a x + x}{\frac{1}{2} a + x} - x = \frac{\frac{1}{2} a x}{\frac{1}{2} a + x}$ ; and, therefore, that point

being given, the tangent may be easily drawn.

The manner of drawing tangents to all sorts of hyperbolas universally, will be the same as in the ellipses, the equations of the two kinds of curves differing in nothing but their signs.

After the manner above explained, the subtangent, in curves whose abscissas are right lines, may be determined; but if the absciss, or line terminating the ordinate, on the lower part, be another curve, then the tangent may be drawn as in the following example.

VII. Let the curve  $B R F$  (Plate XIV. Anal. fig. 22.) be a cycloid; whose absciss is here supposed to be the semicircle  $B P A$ , to which let the tangent  $P T$  be drawn, as above. Moreover, let  $r R H$  be a tangent to the cycloid, at the corresponding point  $R$ , and let  $G R e$  be parallel to  $T P v$ ; putting the arc, or absciss,  $B P = z$ , its ordinate  $P R = y$ ,  $A F = b$ , and  $B P A = c$ ; then, by the property of the cycloid, we shall have  $c (B P A) : b$

$(A F :: z (B P) : y (P R))$ ; therefore  $y = \frac{b z}{c}$ , and  $r =$

$\frac{b \dot{z}}{c} = r e$ . But by similar triangles,  $r e (y) : R e (= P v$

$= \dot{z}) :: P R (y) : P H = \frac{y \dot{z}}{y} = z$  (because  $y = \frac{b z}{c}$ ); con-

sequently, if in the right line  $P T$ , there be taken  $P H$  equal to the arc  $P B$ , we shall have a point  $H$ , through which the tangent of the cycloid must pass.

The preceding examples relate to curves, whose ordinates are parallel to each other. We shall now briefly illustrate the method of drawing tangents to curves of the spiral kind, all whose ordinates issue from a point: such as the spiral  $B A G$  (Plate XV. Anal. fig. 1.) whose ordinates,  $C B, C A, C G$ , are referred to the point  $C$ , called the centre of the spiral. Let  $S A N$  be a tangent to the spiral at any point  $A$ , and let  $C T$  be perpendicular to it, and let the arc  $C B A$  (considered as variable by the motion of  $A$  towards  $G$ ) be denoted by  $z$ , and the ordinate  $C A$  by  $y$ . Then  $\dot{z} : \dot{y} ::$

$A C (y) : A T = \frac{y \dot{z}}{\dot{z}}$ . Hence, if upon  $C A$ , as a dia-

meter, a femicircle be described, and in it, from  $A$ , a right

line equal to  $\frac{y \dot{z}}{\dot{z}}$  be inscribed, that right line will be a tan-

gent to the spiral at the point  $A$ .

VIII. Let the nature of the curve  $C B A$  be such, that the arc  $C B A$  may be, always, to its corresponding ordinate  $C A$  in a constant ratio, viz. as  $a$  to  $b$ : then, because

$z : y :: a : b$ , we have  $z = \frac{a y}{b}$ , and  $\dot{z} = \frac{a \dot{y}}{b}$ ; and, conse-

quently,  $A T \left( \frac{y \dot{z}}{\dot{z}} \right) = \frac{b y}{a} = \frac{b}{a} \times A C$ : therefore  $A C$

and  $A T$  being in a constant ratio, the angle  $C A T$  must also be invariable; which is a known property of the logarithmic spiral.

IX. Let  $B A A$  (fig. 2.) be the spiral of Archimedes; whose nature is such, that the part  $E A$  of the generating ordinate, intercepted by the spiral, and a circle,  $B E D$ , described about the same centre  $C$ , is always in a constant ratio to the corresponding arc  $B E$  of that circle. Suppose  $A n$  perpendicular to  $A C$ ;  $B C = c$ ,  $C A = y$ , and the given ratio of  $A E$  to  $B E$ , that of  $b$  to  $c$ ; then

$b : c :: y - c (A E) : \frac{c y - c c}{b} = B E$ ; whose fluxion is =

$\frac{c \dot{y}}{b}$ . If the right line  $C E A a$  be supposed to revolve about

the centre  $C$ , the angular celerity of the generating point  $A$ , in the perpendicular direction  $A n$ , will be to that of  $E$ , as  $A C$  to  $E C$ ; and as the latter of these celerities is ex-

pressed by  $\frac{c \dot{y}}{b}$ , the former will be expressed by  $\frac{y}{c} \times \frac{c \dot{y}}{b}$ ,

or  $\frac{y \dot{y}}{b}$ ; which is to  $\frac{y \dot{y}}{b}$ , the celerity of  $A$  in the direction

$A a$ , as  $\frac{y}{b}$  to unit, or as  $y$  to  $b$ . Consequently,  $C T$  and

$A T$  are in the same ratio, and  $A C : C T :: \sqrt{y y + b b}$

$: y$ ; and  $A C : A T :: \sqrt{y y + b b} : b$ ; whence  $C T$  and

$A T$  are given, equal to  $\frac{y^2}{\sqrt{y y + b b}}$ , and  $\frac{b y}{\sqrt{y y + b b}}$  re-

spectively; from either of which expressions the tangent  $A T$  may be drawn; and, in the same manner, may the position of the tangent of any other spiral be determined. Simpson's Flux. vol. i. sect. 3.

As to the method of investigating tangents by fluxions, see Macl. Flux. book i. c. 7. where it is demonstrated independently of infinitesimals.

# TANGENT.

To determine the tangents of curves, supposed to be described by the interfections of right lines revolving about given poles, see Mr. Maclaurin's Fluxions, art. 210, seq. In finding the tangents of curves by the method of infinitesimal differences, it has been objected that the conclusion is found by a double error. 1. By taking the curve for a polygon of an infinite number of sides. 2. By the false rule for taking the differential of a power. But there is no need of such suppositions in the method of fluxions, for it may be geometrically demonstrated, that the fluxions of the base, ordinate, and curve, are in the same proportion to each other, as the sides of a triangle respectively parallel to the base, ordinate, and tangent. When the base is supposed to flow uniformly, if the curve be convex towards the base, the ordinate and curve increase with accelerated motions; but their fluxions at any term are the same as if the point which describes the curve had proceeded uniformly from that term in the tangent. Any farther increment which the ordinate or curve acquires, is to be imputed to the acceleration of the motions with which they flow. See Maclaurin's Fluxions, book i. chap. vii. and viii.

Any two arcs of curve lines touch together, when the same right line is the tangent of both at the same point. But when they are applied to each other in this manner, they never perfectly coincide, unless they be similar arcs of similar and equal figures.

In the Philosophical Transactions, we have the following method of drawing tangents to all geometrical curves, without any labour or calculation, by M. Sluſius.

Suppose a curve, as DQ (*Plate XV. Anal. fig. 3.*) whose points are all referrible to any right line given, as EAB, whether that right line be the diameter or not; or whether there be more given right lines than one, provided their powers do but come into the equation. In all his equations, he puts  $v$  for the line DA,  $y$  for BA; and for EB, and the other given lines, he puts  $b, d, &c.$  that is, always consonants only.

Then, supposing DC to be drawn touching the curve in D, and meeting with EB produced in C, he calls the sought line, CA, by the name of  $a$ .

To find which, he gives this general method. 1. Reject out of the equation all members which have not either  $v$  or  $y$  in them; then put all those that have  $y$  on one side, and all those which have  $v$  on the other; with their signs + or -; and the latter, for distinction and ease sake, he calls the right, the former the left side. 2. On the right side, let there be prefixed to each member the exponent of the power, which  $v$  hath there; or, which is the same thing, let that exponent be multiplied into all the members. 3. Let the same be done also on the left side, multiplying each member there by the power of the exponent of  $y$ ; adding this moreover, that one  $y$  must, in each part, be changed into  $a$ . This done, the equation thus reformed will shew the method of drawing the required tangent to the point D; for, that being given, as also  $y, v$ , and the other quantities expressed by consonants,  $a$  cannot be unknown. Suppose an equation  $by - yy = vv$ , in which EB is called  $b$ ; BA =  $y$ , DA =  $v$ , and let  $a$ , or AC, be required so as to find the point C, from whence CD being drawn, shall be a true tangent to that curve QD in D. In this example, nothing is to be rejected out of the equation, because  $y$  or  $v$  are in each member: it is also disposed, as required by the rule 1; to each part, therefore, there must be prefixed the exponent of the powers of  $y$  or  $v$ , as in the rule 2; and on the left side, let one  $y$  be changed into  $a$ , and then the equation will be in this form,  $ba - 2ya = 2vv$ , which equa-

tion reduced, gives easily the value of  $a = \frac{2vv}{b - 2y} = AC$ .

And so the point C is found, from which the tangent DC may be drawn.

To determine which way the tangent is to be drawn, whether towards B or E, he directs to consider the numerator and denominator of the fraction. For, 1. If in both parts of the fraction all the signs are affirmative; or if the affirmative ones are more in number; then the tangent is to run towards B. 2. If the affirmative quantities are greater than the negative in the numerator, but equal to those in the denominator, the right line drawn through D, and touching the curve in that point, will be parallel to AB; for in this case  $a$  is of an infinite length. 3. If in both parts of the fraction the affirmative quantities are less than the negative, changing all the signs, the tangent must be drawn now also towards B; for this case, after the change, comes to be the same as the first. 4. If the affirmative quantities are greater than the negative in the denominator, but in the numerator are less, or *vice versa*, then changing the signs in that part of the fraction where they are less, the tangent must be drawn a contrary way; that is, AC must be taken towards E. 5. But whenever the affirmative and negative quantities are equal in the numerator, let them be how they will in the denominator,  $a$  will vanish into nothing; and, consequently, the tangent is either AD itself, or EA, or parallel to it; as will easily be found by the data. This he gives plain examples of, in reference to the circle, thus: let there be a femicircle, whose diameter is EB; in which there is given any point, as D (*fig. 4.*), from which the perpendicular DA is let fall to the diameter. Let DA =  $v$ , BA =  $y$ , BE =  $b$ ; then the equation will be  $by - yy = vv$ , and drawing the tangent DC, we have AC, or  $a =$

$\frac{2vv}{b - 2y}$ . Now, if  $b$  be greater than  $2y$ , the tangent must

be drawn towards B; if less, towards E; if it be equal to it, it will be parallel to EB, as was said in the first, second, and fourth rules.

Let there be another femicircle inverted, as NDD (*fig. 5.*), the points of whose periphery are referred to the right line BE, parallel and equal to the diameter. Let NB be called  $d$ , and all things else as before; then the equation will be  $by - yy = dd + vv - 2dv$ ; which being ma-

naged according to his rules, you have  $a = \frac{2vv - 2dv}{b - 2y}$ .

Now, since  $v$  here is supposed to be always less than  $d$ ; if  $b$  be greater than  $2y$ , then the tangent must be drawn towards E; if equal, it will be parallel to BE; if less, changing all the signs, the tangent must be drawn towards B, as by rules fourth, fifth, and third. But there could be no tangent drawn, or at least EB would be it, if NB had been taken equal to the diameter. Let there be another femicircle, whose diameter NB (*fig. 6.*) is perpendicular to EB, and to which its points are supposed to be referred.

Let NB be called  $b$ , and all things else as above; the equation will be  $yy = bv - vv$ , and  $a = \frac{bv - 2vv}{2y}$ . If,

now,  $b$  be greater than  $2v$ , the tangent must be drawn towards B; if less, towards E; if equal, DA will be the tangent, as appears by rules fourth and fifth.

TANGENTS, *Inverse Method of*, is a method of finding the equation, or the construction, of any curve; from the tangent

gent of any other line, whose determination depends on the tangent given.

This method is also one of the great results of the new *calculus integralis*.

Its application we shall give in what follows. The fluxional expressions of the tangent, sub-tangent, &c. being delivered under the last article, if you make the given value equal to the fluxional expression, and either sum up the fluxional equation, or, if that cannot be, construct it, the curve required is had. For example :

1. To find the curve-line, whose sub-tangent =  $\frac{2y^2}{a}$ .

Since the sub-tangent of an algebraic line is =  $\frac{y\dot{x}}{\dot{y}}$ ; we

have  $\frac{y\dot{x}}{\dot{y}} = \frac{2y^2}{a}$ , and  $ay\dot{x} = 2y^2\dot{y}$ , and  $a\dot{x} = 2y\dot{y}$ ;

therefore (taking the fluents by the inverse method of fluxions)  $ax = y^2$ .

The curve sought, therefore, is a parabola; whose construction is shewn under PARABOLA.

2. To find the curve, whose sub-tangent is a third proportional to  $\frac{1}{2}a - x$  and  $y$ . Since  $\frac{1}{2}a - x : y :: y : \frac{y\dot{x}}{\dot{y}}$ , we

have  $\frac{1}{2}a - x : y :: y\dot{y} : y\dot{x} :: \dot{y} : \dot{x}$ ; consequently  $\frac{1}{2}a\dot{x} - x\dot{x} = y\dot{y}$ , and, taking the fluents,  $\frac{1}{2}ax - \frac{1}{2}x^2 = \frac{1}{2}y^2$ , i. e.  $ax - x^2 = y^2$ . The curve sought is, therefore, a circle.

3. To find a line, wherein the sub-tangent is equal to the semiordinate. Since  $\frac{y\dot{x}}{\dot{y}} = y$ ;  $y\dot{x} = y\dot{y}$ , and  $\dot{x} = \dot{y}$ ; therefore  $x = y$ .

Hence it appears, that the line sought is a right line, which respects the cathetus of an equilateral triangle, as an axis, or the hypotenuse of an equilateral rectangled triangle. If  $x$  had been taken for the arc of a circle, the line sought had been a cycloid.

TANGER, in *Geography*, a river of Westphalia, which runs into the Elbe at Tangermunde.

TANGERE, *Noli me*. See NOLI.

TANGERMUNDE, in *Geography*, a town of Westphalia, in the Old Mark of Brandenburg, situated on the Elbe, where vessels pay a toll: the chief trade of the town is brewing; 24 miles N. of Magdeburg. N. lat.  $52^\circ 32'$ . E. long.  $12^\circ 2'$ .

TANGHOO, or TENHOO, a capital of a province of Tonquin, situated on a small river near the W. coast of the gulf of Cochinchina. Rice and cattle constitute the chief riches of the province. The town is called "Cuabang." N. lat.  $19^\circ 40'$ .

TANGIA, a town of Arabia, in the province of Hedjaz; 50 miles W.N.W. of El Catif.

TANGIBLE. See TACTILE.

TANGIER ISLANDS, in *Geography*, several islands of the Chesapeake, near the coast of Maryland, opposite to the mouth of the Potomack. N. lat.  $38^\circ 12'$ . W. long.  $76^\circ 12'$ .

TANGIERS, anciently called *Tinjis* and *Tingia*, and now by the Arabs *Tinjab*, a town of Africa, in Fez, situated at the western mouth of the straits of Gibraltar, about a day's journey from Tetuan. This town was first possessed by the Romans, who took it under Sertorius; next by the Goths; and it was surrendered by count Julian to the Saracens. It was taken in 1471 by Alonso, king of Portugal; and given

to Charles II., king of England, in 1662, as a marriage portion with the princess Catherine of Portugal. The English abandoned it in 1684, after destroying the mole and fortifications. Although now almost in ruins, it still retains some batteries, in tolerable condition, facing the bay; at the bottom of which are a river, and the remains of the bridge of Old Tangiers; but on account of the accumulated sand, the bridge, if it had continued, as well as the river, would be useless. The bay of Tangiers, independently of Ceuta, is so situated, being the narrowest part of the straits, that it must be favourable to Moorish piracy; but Tangiers can never be a commercial town, as it has few productions in its vicinity; the Spaniards, however, formerly shipped in this place, eggs, vegetables, and some fruits; and the English at present obtain supplies for their garrison at Gibraltar. The bay of Tangiers is not very safe when the wind is in the west, having been encumbered by the ruins of the mole and fortification, as the cables are liable to be rent, and the ships to be driven on shore. The best anchorage for frigates and the larger vessels, is at the eastern point, whence they may easily sail whatever way the wind sets: however, the bay is only dangerous in winter; 108 miles N.N.W. of Fez, and 38 W.S.W. of Gibraltar. N. lat.  $35^\circ 42'$ . W. long.  $5^\circ 50'$ . Chenier's Morocco.

TANGLAKE, in *Ichthyology*, the viviparous blenny of Pennant; the *mustela vivipara* of Willughby, Ray, &c.; and the *blennius viviparus* of the Linnean system.

TANGMEW, in *Geography*, a town of the Birman empire, on the right bank of the Ava; 10 miles N.W. of Prome.

TANGO, a town of Japan, in the island of Niphon; 65 miles S.W. of Meaco.

TANGOLOTANGO, a seaport town of Mexico, in the province of Guaxaca, near the gulf of Mexico; 100 miles S.S.E. of Guaxaca. N. lat.  $16^\circ 8'$ . W. long.  $97^\circ 36'$ .

TANGONE, a town of New York; 9 miles W. of Kingston.

TANGOZI, a town on the east coast of Madagascar. S. lat.  $10^\circ 5'$ . E. long.  $49^\circ 12'$ .

TANGOZLIO, a town of Asiatic Turkey, in Nantolia; 70 miles E.S.E. of Smyrna.

TANGU, a city of Pegu, and capital of a province which was formerly a kingdom; situated a considerable distance to the north of Pegu.

TANGUEY, or TONGUEY, a town of Chili, on the coast. S. lat.  $30^\circ 30'$ .

TANGUIA, a river of Chinese Tartary, which rises near mount Ilha, and running nearly south, falls into the river Ya-lou-kiang.

TANGULAW, a small island in the Spanish Main, near the Mosquito shore. N. lat.  $13^\circ 35'$ . W. long.  $83^\circ 55'$ .

TANGUT. See THIBET.

TANG-YANG, a lake of China, about thirty miles in circumference; 32 miles N. of Hoai-ngan.

TANIALA, a town of Hindoostan, in Palnaud; 25 miles E.N.E. of Timerycotta.

TANIBOUCA, in *Botany*, a Caribæan name, to be tolerated only till the genus is properly understood.—Aubl. Guian. 448. Juss. 76.—Class and order, *Decandria Monogynia*. Nat. Ord. *Elaeagni?* Juss.

Gen. Ch. *Cal.* Perianth superior, of one leaf, bell-shaped, internally downy; its limb in five deep, roundish, acute segments. *Cor.* none. *Stam.* Filaments ten, thread-shaped, inserted into the tube of the calyx, as long as its limb; anthers oval, of two lobes. *Pist.* Germen inferior, roundish; style solitary, thread-shaped, curved; stigma simple. *Peric.* . . .

Eff. Ch. Calyx bell-shaped, five-cleft, superior. Corolla none. Fruit . . . . .

1. *T. guianensis*. Aubl. t. 178.—Native of marshes in Guiana, flowering in May. A tree, whose trunk is twenty feet, or more, in height, and two feet in diameter, with a whitish, light and brittle wood; the bark greyish. Branches spreading every way; their young shoots leafy at the ends. Leaves deciduous, alternate, stalked, obovate, pointed, entire, coriaceous, smooth; the largest seven inches long, and three broad. Spikes axillary, solitary, stalked, about three or four inches long, of many small, alternate, greenish, fragrant flowers, clothed internally with white hairs. Aublet not having met with the fruit, nor having been able to determine any thing of the internal structure of the minute germen, we are left in great doubt as to the essential character of this genus, and even its natural order. Nothing is recorded of its use or qualities.

TANICHI, in *Geography*, a town of Hindoostan, in the Carnatic; 16 miles S.S.W. of Trichinopoly.

TANILA, a river of Mexico, which runs into the gulf of Mexico, N. lat.  $18^{\circ} 10'$ . W. long.  $95^{\circ} 6'$ .

TANINGE, a town of France, in the department of the Lemau; 24 miles S.E. of Geneva.

TANJONG Currag, a town on the west coast of the island of Lombok. S. lat.  $8^{\circ} 31'$ . E. long.  $115^{\circ} 48'$ .

TANJONG Putus, a town of Malacca, on the north side of the river Pera, where the Dutch have a factory.

TANJORE, a country of Hindoostan, included in the Carnatic; bounded on the north and west by part of the Carnatic, and on the east and south by the gulf of Bengal: about ninety-five miles in length from north to south, and fifty in breadth from east to west; watered by the river Cauvery, which divides itself into several streams. Though forming a part of the Carnatic, it is governed by a prince or rajah, and pays an annual subsidy to the English of 160,000*l*. sterling.

TANJORE, a town of Hindoostan, and capital of a country to which it gives name, situated in a plain between two branches of the Cauvery; including the suburbs, about two leagues in circumference; a double wall and a large ditch are the only defence. The palace is situated to the east of the town, and is a grand square, fortified with a wall and a wet ditch, abounding in crocodiles. It was originally only a pagoda. In 1773, this city was taken by the British under general Joseph Smith; 176 miles S.E. of Seringapatam. N. lat.  $10^{\circ} 46'$ . E. long.  $79^{\circ} 10'$ .

TANIS, in *Ancient Geography*, a town of Egypt, situated between the Mendesian mouth of the Nile towards the west, and the Pelusian mouth to the east. It lay on a small branch of the Nile, and gave its name to one of the mouths of the river. This town was the capital of the nome called Tanites.

TANISTRY, TANISTRIA, an ancient municipal law, or tenure, which allotted the inheritance of lands, castles, &c. held by this tenure, to the oldest and most worthy and capable person of the deceased's name and blood, without any regard to proximity. This, in reality, was giving it to the strongest; and this naturally occasioned bloody wars in families; for which reason it was abolished under king James I.

Sir John Davies describes it thus: "Quant aucun person morust seisie des aucuns castles, manors, terres ou tenements del nature et tenure de tanistry; que donques meismes le castles, &c. doent descender, et de temps dont memory ne court ont use de descender, *Seniori et dignissimo viro sanguinis et cognominis de tiel person,*" &c.

TANITICUM OSTIUM, in *Ancient Geography*, the name of the sixth mouth of the Nile, in passing from the west to the east.

TANKABAT, in *Geography*. See TANTABEE.

TANKARD TURNIP, in *Agriculture*, the common English name of a particular sort of this kind of root, which has the property of standing high above the ground. It is a good sort for feeding off before the frost sets in, in the winter season; but after that has taken place, it is not so valuable or useful, as being more liable to be injured and affected by it than the other sorts, in consequence of standing exposed so much above the surface of the land. See TURNIP.

TANKERDSONG, in *Geography*, a town of Thibet; 230 miles E. of Lassa. N. lat.  $29^{\circ} 50'$ . E. long.  $100^{\circ}$ .

TANKESIR, a town of Persia, near the gulf; 9 miles N. of Basneer.

TANKISA, a town and fortrefs of Thibet, at the foot of a mountain, which is said to exhale suffocating fumes; 120 miles N.W. of Tassafudon. N. lat.  $28^{\circ} 23'$ . E. long.  $87^{\circ} 20'$ .

TANKROWAL, a town of Africa, in the kingdom of Kaen, with a factory belonging to the English African company, near the river Gambia. The Portuguese have a church there. The chief trade is in wax. N. lat.  $13^{\circ} 10'$ . W. long.  $14^{\circ} 27'$ .

TANKUNNY, a town of Hindoostan, in Berar; 20 miles W. of Ellichpour.

TANLAY, a town of France, in the department of the Yonne; 6 miles E. of Tonnerre.

TANLOCOM, a town of Mexico, in the province of Guafteca; 40 miles S.W. of St. Yago de los Valles.

TANNA, an island in the South Pacific ocean, and one of those called *New Hebrides*, discovered by captain Cook in the year 1774; about twenty-two miles in length, and ten in breadth. The inhabitants would not suffer captain Cook, or any of his company, to advance far into the island. The produce, as far as could be seen, is bread-fruit, plantains, cocoa-nuts, a fruit like a nectarine, yams, tarra, a sort of potatoe, sugar-cane, wild figs, a fruit like an orange, which is not eatable, and some other fruits and nuts. Captain Cook doubts not but nutmegs likewise grow in this island. The bread-fruit, cocoa-nut, and plantains, are neither so plentiful nor so good as at Otaheite; on the other hand, sugar-canes and yams are not only in great plenty, but of superior quality, and much larger. One of the latter weighed fifty-six pounds, every ounce of which was good; hogs did not seem to be scarce; but they saw not many fowls. These are the only domestic animals they have. Land-birds are not more numerous than at Otaheite, and the other islands; but they saw some small birds, with a very beautiful plumage, which they had never seen before. There is a great variety of trees and plants. The inhabitants of this island, as well as those of Erromango, were at first thought to be a race between the natives of the Friendly Islands and those of Mallicollo; but upon further acquaintance, it was found that they had little or no affinity to either, except in their hair, which is generally black and brown, growing to a tolerable length, and very crisp and curly. Their beards, which are strong and bristly, are generally short. One of the languages which they speak is nearly, if not exactly, the same with that of the Friendly Islands: the other, which is also that of Erromango and Annatom, is properly their own. These people are of the middle size, rather slender than otherwise; many are little, but few tall or stout; most of them have good features and agreeable countenances, are, like all

the tropical race, active and nimble, and seem to excel in the use of arms, but not to be fond of labour. Both sexes are of a very dark colour, but not black; nor have they the least characteristic of the negro about them. They make themselves blacker than they really are, by painting their faces with a pigment of the colour of black lead. They also use another sort, which is red; and a third sort, brown, or a colour between red and black. All these, but especially the first, they lay on with a liberal hand, not only on the face, but on the neck, shoulders, and breast. The men wear nothing but a belt, and the wrapping-leaf, as at Mallicollo. The women have a kind of petticoat, made of the filaments of the plain-tree, flags, or some such thing, which reaches below the knee. Both sexes wear ornaments, such as bracelets, ear-rings, necklaces, and amulets. The bracelets are chiefly worn by the men; some made of sea-shells, and others of those of the cocoa-nuts. The men also wear amulets; and those of most value being made of a greenish stone, the green stone of New Zealand is valued by them for this purpose. Necklaces are chiefly used by the women, and made mostly of shells; ear-rings are common to both sexes, and those valued most are made of tortoise-shell. These people, beside the cultivation of ground, have few other arts worth mentioning. They know how to make a coarse kind of matting, and a coarse cloth of the bark of a tree, which is chiefly used for belts. The workmanship of their canoes is very rude; and their arms, with which they take the most pains in point of neatness, come far short of some others. Their weapons are clubs, spears, or darts, bows and arrows, and stones. The clubs are of three or four kinds, and from three to five feet long. Captain Cook knew no more of their cookery, than that it consists of roasting and baking; for they have no vessels in which water can be boiled. Nor did he know that they had any other liquor but water, and the juice of the cocoa-nut. They were utter strangers to their religion, and but little acquainted with their government. They seem to have chiefs among them, at least some were pointed out to him by that title; but they appeared to have very little authority over the rest of the people. They gave intimations that they practised circumcision, and that they allowed themselves to eat human flesh; but captain Cook says, that it admits of doubt whether they are cannibals. The island contains a very considerable volcano, and some hot springs were discovered, which raised the thermometer from 80° to 170°, and in one place to 202°. Captain Cook named the harbour where he lay, *Port Resolution*, from the name of the ship, which was the first that had ever entered it; which is situated in S. lat. 19° 32' 25". E. long. 169° 44' 35". The variation of the needle was 7° 14' 12" E.; and the dip of its south end 45° 23'. The time of high water on full and change days was about 5<sup>h</sup> 45<sup>m</sup>, and the tide rose and fell three feet.

**TANNA**, a town of Hindoostan, in the island of Salfette, on the east coast; 15 miles N.E. of Bombay. N. lat. 19° 13'. E. long. 72° 53'.

**TANNA**, or *Thann*, a town of Saxony, in the county of Renssén; 17 miles S.W. of Greitz. N. lat. 50° 25'. E. long. 11° 57'.

**TANNA Balloo**, a small island in the East-Indian sea, near the east coast of Borneo. N. lat. 4° 52'. E. long. 118° 21'.

**TANNA Mera**, a small island in the East-Indian sea, near the east coast of Borneo. N. lat. 3° 45'. E. long. 117° 5'.

**TANNAR**, a town of Bengal; 35 miles E.S.E. of Moorshedabad.

**TANNAS**, a town of Sweden, in Harjedalen; 15 miles N.W. of Langaschantz.

**TANNASER**, a town of Hindoostan, in the subah of Delhi. This place was formerly held faced by the Hindoos. In 1011 it was taken by Mahmood, king of Gizni; 45 miles N.E. of Hissar. N. lat. 29° 31'. E. long. 76° 20'.

**TANNAY**, a town of France, in the department of the Nièvre; 16 miles S.S.E. of Clamecy.

**TANNENDORF**, a town of the principality of Culmbach; 8 miles S. of Culmbach.

**TANNEBERG**, a town of Austria; 8 miles S. of Aigen.

**TANNED HIDE**. See **HIDE** and **LEATHER**.

**TANNENBERG**, in *Geography*, a town of Prussia, in the province of Oberland; 6 miles S.S.W. of Hohenstein. —Also, a town of Saxony, in the circle of Erzgebirg; 6 miles S.W. of Wolkenstein.

**TANNER**, **THOMAS**, in *Biography*, an English prelate, and eminent antiquary, was the son of a clergyman, who was vicar of the parish of Market Levington, in Wiltshire, where he was born in the year 1674. He entered into Queen's college, Oxford, in 1689, and having graduated as B.A., he removed to All-Souls college in 1694, of which he became a fellow in 1696. At the university he devoted himself very much to the study of antiquities, and in 1695 published his "Notitia Monastica," or "A short Account of the religious Houses in England and Wales," which attracted notice; and soon after Dr. Moore, bishop of Norwich, appointed him his chaplain, and in 1701 made him chancellor of his diocese; which office led him to acquire an extensive and correct acquaintance with municipal and ecclesiastical law, so that he was often consulted by the dignitaries of the church. Having married the bishop's daughter, he obtained in succession various preferments; and in 1710 he took the degree of D.D. In 1723 he became canon of Christ-church, Oxford; in 1727, prolocutor of the lower house of convocation; and in 1732, bishop of St. Asaph. He died at Christ-church, in 1735, where he was buried. He was thrice married, but left only one son. He was distinguished by the exemplary discharge of his clerical functions, and by the liberality of his charities. Availing himself of papers presented to him by Wood, he published a second edition of his "Athenæ Oxonienses," much corrected and enlarged, with the addition of more than five hundred lives from the author's MS. Lond. 1721. 2 vols. fol. A posthumous work, founded on his Notitia, and entitled "Notitia Monastica; or, an Account of all the Abbies, Priors, and Houses of Friars, heretofore in England and Wales, and also of all the Colleges and Hospitals founded before 1540;" was published by his brother, the Rev. John Tanner, Lond. 1744. fol. Another elaborate work, on which he had bestowed the application of forty years, entitled "Bibliotheca Britannico-Hibernica; five, de Scriptoribus qui in Anglia, Scotia, et Hibernia, ad sæculi xviii. initium floruerunt, literarum ordine juxta familiarum nomina dispositis Commentarius, &c." was published in 1748, fol. under the care of Dr. Wilkins, who prefixed to it a learned preface. He had also made collections for the history of his native county of Wilts, but by removal to a distance he was prevented from prosecuting his design. To the Bodleian library he bequeathed many valuable papers, tending to illustrate the history of these islands, and he made several communications of a similar nature to the Society of Antiquaries, of which he was a member. His various labours in this way rank him among the most valuable contributors to British literature and ecclesiastical history. Biog. Brit. Gen. Biog.

**TANNER**,

**TANNER**, a person who manufactures hides and skins by tanning.

It is only within a few years past, that the tanners of this country have been liberated from a variety of penalties and prohibitions, which were extremely oppressive, and long retarded the progress of the manufacture.

In the reigns of Elizabeth and James I. when *patents of monopoly* were in existence—when the true principles of trade were not well understood—and when the leather manufacture was conducted by unskilful persons, some rules and regulations as to the mode and manner of tanning, the materials to be employed, and the time to be consumed in the process, might, perhaps, be in some degree necessary: but such prohibitions and restrictions were wholly inapplicable to the present enlightened age. It was not, however, till 1808, after a long parliamentary investigation, that the act 1 James I. c. 22, and others of a similar tendency which had long disgraced our statute-book, were at length repealed by the 48 Geo. III. c. 60. By this act, the tanner is now allowed, like all other manufacturers, to exercise his ingenuity in the discovery of new materials or new methods, in abridging the time or improving the process. Nor can any injury thereby arise to the community; for the competition which in this country exists in every branch of trade, combined with the credit and the interest of the parties, will always insure to the public the production of the best articles which can be manufactured. See **LEATHER**, **TAWING**, and **VELLUM**.

**TANNER's Bark**, is the bark of the oak or other tree, which, after it has been ground in a mill into a coarse powder, is used in tanning of leather. When the tanning principle has been wholly exhausted, it is taken out of the pits, and called *tan*. It is then sold to the gardeners, who use it in hot-houses to produce an artificial heat, for the purpose of raising pine-apples, &c. After a certain time the tan ceases to cause fermentation: it is then taken out of the hot-house, and, when entirely rotted, becomes a vegetable mould, and is employed as a manure in kitchen-gardens and on grass-land.

With respect to its advantages as a manure, different opinions are entertained. Miller, Mortimer, and others, have represented it as highly nutritious, while more modern agriculturalists consider it of very little value. When, however, it is blended and incorporated with other vegetable substances, or with lime or earthy matter in certain proportions, cautiously employed, and laid on soon after Michaelmas, it will be found a good top-dressing for stiff and cold grass-land.

**TANNETE**, in *Geography*, a town on the W. coast of the island of Celebes. S. lat.  $4^{\circ} 14'$ . E. long.  $120^{\circ} 4'$ .

**TANNEWANG**, a river on the S. coast of the island of Celebes, which runs into the sea, 5 miles W. of Bonthain.

**TANNHAUSEN**. See **THANNHAUSEN**.

**TANNIN**, in *Vegetable Chemistry*, a peculiar substance which is naturally formed, and exists in a great number of vegetable bodies, such as oak bark, galls, fumach, catechu, &c. Its name is derived from the effect it has in converting the gelatine into leather.

Several processes have been given to obtain pure tannin, which have been so various in their results, as to induce chemists to suspect the identity of tannin.

The process recommended for procuring pure tannin, is to powder nutgalls, and make an infusion in water, which will be of a deep brown colour. Evaporate the infusion with a gentle heat till it is very strong, but still retaining its humidity. Add to this a saturated solution of carbonate of potash. A yellowish-white precipitate is formed, which is said to be

pure tannin. When the liquid part is poured off, a little cold water must be added to wash the precipitate, as a large quantity would dissolve it again. When the precipitate is separated and dried, it assumes the appearance of resin, having a vitreous fracture. It is of a brown colour. Its taste is bitter, and strongly astringent. It is very soluble in water. The solution becomes frothy by agitation, as if it contained soap. It dissolves still more plentifully in alcohol. The solution is of a dark-brown colour, differing little in its properties and appearance from what has been termed tincture of galls.

For our first knowledge of this substance in a definite state, we are indebted to Deyeux. Seguin afterwards separated it by means of a solution of gelatine, the matter which was precipitated being a substance, having the smell and many other properties of leather. These facts led to the great improvements he made in the process of tanning, of which no true theory was known before his time.

For a more minute investigation of the properties of tannin, we are indebted to Proust. He obtained his tannin by adding an acid to a concentrated infusion of nutgalls. A precipitate is obtained of the consistency of pitch. This precipitate is to be washed with a little cold water, with the same caution observed in the last process. The precipitate is now to be dissolved in boiling water, and carbonate of potash added, which takes up the acid and precipitates the tannin.

Proust recommends the following process for procuring pure tannin. Drop into an infusion of nutgalls, a solution of muriate of tin. This gives a yellow precipitate, which being separated, washed, and dried, is of a buff-colour. This is a compound of oxyd of tin and tannin. He then mixes this powder with water, and passes through it sulphuretted hydrogen gas. The sulphur combines with the tin, and becomes insoluble, while the tannin dissolves in the water. When the sulphuret is separated, and the solution of tannin evaporated with a gentle heat, a brown substance is left behind, which he considered as pure tannin.

Another process for obtaining tannin from infusion of nutgalls, has been given by Merat Guillot. This consists in mixing pure water with an infusion of galls. If to this mixture dilute nitric or muriatic acid be added, a deep brown precipitate is formed, which, when dry, becomes black. This he supposes to be pure tannin.

Trommidorff has shewn that all these processes are insufficient to produce pure tannin. As the substance called extract was contained in all the above precipitates, and more or less gallic acid, he made a great number of experiments to obtain pure tannin; and although he obtained it nearer to a state of purity than any of his predecessors, his labours were not completely successful. He evaporated the infusion of galls with a gentle heat to one-fourth its bulk. The liquid became muddy from the precipitation of extractive matter, and was separated by straining. It was now further evaporated to the consistence of jelly, and ultimately dried by a gentle heat. He now digested the mass with pure alcohol, till no more gallic acid could be taken up. He then considered the mass left behind as pure tannin, or nearly so. In order to ascertain if it still contained extract, he re-dissolved it in pure water, and evaporated this and future portions of water from it, judging that if any extract still remained it would become insoluble by oxygenation, and thus be precipitated, but no deposition took place. Suspecting it might contain mucilage, he left the solution in a warm place for some time. It became covered with mould, which he attributed to the presence of mucilage. The mould was separated by filtration, and the solution evaporated

## TANNIN.

rated to dryness, which left the tannin in a state of considerable purity.

He still, however, found that it contained a portion of sulphate of lime. In order to separate this salt, he dissolved the tannin in water, to which he added carbonate of potash: this caused a precipitation, which has been already noticed. The clear liquor being separated, a solution of acetite of lead was added to it. A precipitate fell down, which consisted of tannin, combined with oxyd of lead, and probably sulphate of lead. The lime also combined with the tannin, forming an insoluble compound. He then separated this precipitate, mixed it with water, and passed a stream of sulphuretted hydrogen gas through it. The lead and sulphur became separated, and the combination of lime and tannin unchanged, while the pure tannin remained in solution, which was obtained by evaporating the separated liquid to dryness. The tannin thus obtained, approaches much nearer to purity than that obtained by any of the former processes. But we shall shew further on, that, even in this state, its purity is doubtful.

Tannin obtained by the above process does not differ much from that formed by the other processes. We have already stated it to be soluble in alcohol: when, however, both the tannin and alcohol are pure, the tannin does not dissolve.

Most of the metallic oxyds form insoluble compounds with tannin. There is, however, great reason to believe that the gallic acid, which is difficult to separate from it, has a much greater effect upon these bodies. It is supposed that when the metallic oxyds are precipitated by tannin, the latter combines with the oxygen, and, in some instances, converts the tannin into extract.

The common method of detaching the presence of tannin is by a solution of gelatine in water. Ifinglass is mostly used for this purpose. The solutions both of the tannin and the gelatine should be in a considerably concentrated state; as weak solutions of either redissolve, to a certain extent, the precipitate which the tannin forms with the gelatine.

The gelatine should be quite fresh, as the precipitate is imperfect when it has the least signs of putridity.

Sir Humphrey Davy states that the proportion of the gelatine to the water should be 120 grains of the former to 20 ounces of the latter.

According to the authority of the same chemist, the compound formed by the tannin and gelatine dried at 150°, is composed of

Gelatine	-	-	-	-	54
Tannin	-	-	-	-	46
					100

Potash, soda, and ammonia, combine with tannin, forming compounds which are less soluble in water than pure tannin. These alkalis have a stronger attraction than gelatine for tannin; as the alkaline solutions do not precipitate gelatine till the alkali is saturated by an acid.

The combinations of the earths with tannin are mostly insoluble. Those with barytes and lime are slightly so, and do not precipitate gelatine till an acid is added.

Most of the acids form insoluble compounds with tannin; but when extract is present, it is also precipitated: hence the imperfection of the process for separating tannin by acids.

When perfectly free from gallic acid it has no action upon sulphate of iron; but it produces a deep blue precipitate from the oxyfulphate: hence its effect in common

writing-ink and black dye. The black is not complete without exposure to the air. The precipitate which the tannin forms is very heavy, and almost immediately separates from the water; while that formed by the gallic acid remains longer suspended, and certainly, on that account alone, is an essential ingredient in writing-ink.

Tannin exists in a great number of vegetables in some proportion, but is the most abundant in nutgalls; and of them, the Aleppo galls afford the most. Sir Humphrey Davy has given the following analysis of the Aleppo galls. He extracted, by infusion with water, all the soluble part from 500 grains of powdered galls. This solution he submitted to slow evaporation, from which he obtained, in solid matter, 185 grains. These he found to consist of

Tannin	-	-	-	-	-	130
Gallic acid, with extractive matter	-	-	-	-	-	31
Mucilage and matter rendered insoluble	-	-	-	-	-	12
by evaporation	-	-	-	-	-	12
Calcareous earth and saline matter	-	-	-	-	-	185
					185	

We are indebted to the same distinguished chemist for bringing into notice a new substance, which contains a large proportion of tannin. This substance is brought from the East Indies, and is known by the names of catechu, or terra Japonica. It is produced by the evaporation of a vegetable fusion from the wood of a species of *mimosa*, which grows in India.

There are two varieties of this substance, one brought from Bengal, and the other from Bombay. The former is of a chocolate colour, of the specific gravity 1.28; the latter of a lighter colour, of the specific gravity 1.39. Both have an astringent taste, leaving an impression of sweetness. They are not changed by exposure to the air.

Sir Humphrey procured an infusion from this substance by long decoction, the specific gravity of which was 1.102: 500 grains of this infusion yielded, by evaporation, 41 grains of solid matter; 34 of which were tannin, and 7 of a peculiar extractive matter.

This substance, in its original state, seems to contain a very large proportion of tannin. The above chemist found that 100 grains of the powdered catechu required 18 ounces of water for its infusion. The residuum, or undissolved part, is seldom more than  $\frac{1}{4}$ th of the original weight, and consists of calcareous and aluminous earth, with a little fine sand: 200 grains of the Bombay catechu gave

Tannin	-	-	-	-	-	109
Peculiar extract	-	-	-	-	-	68
Mucilage	-	-	-	-	-	13
Of the residuum above-mentioned	-	-	-	-	-	10
					200	

The catechu from Bengal gave, in 200 grains,

Tannin	-	-	-	-	-	97
Peculiar extractive matter	-	-	-	-	-	73
Mucilage	-	-	-	-	-	16
Residual matter, consisting of lime, alumine, and sand	-	-	-	-	-	14
					200	

The great uncertainty which has prevailed respecting the definite nature of tannin, seems to have been completely removed by the very important discovery made by Mr. Hatchett, who has succeeded in forming artificial tannin. An account of his experiments may be found in three papers in the *Philosophical Transactions* for 1805 and 1806.

The most direct process which is given for obtaining it, is by pouring an ounce of nitric acid, diluted with two parts of water, upon 100 grains of charcoal, in a matrass. This is to be placed in a sand-heat. Great effervescence takes place, and much nitrous gas is disengaged. At the end of two days he added a second ounce of acid, and sometimes even a third. The digestion is continued till the whole is dissolved. This solution is of a reddish-brown colour. It is then to be slowly evaporated to dryness, which produces a brown glossy substance, exhibiting a resinous fracture.

This substance has the following properties :

1. It dissolves in cold water and alcohol.
2. The flavour is highly astringent.
3. Exposed to heat, it smokes a little, swells up, and affords a bulky coal.
4. The solution in water reddens litmus paper.
5. It copiously precipitates the metallic salts, especially the muriate of tin, acetite of lead, and oxyfulphate of iron. The precipitates are commonly of a brown colour.
6. It precipitates gold in the metallic state.
7. It precipitates the earthy salts; such as the nitrates of lime, barytes, &c.
8. When the alkalies are added to this solution, the colour becomes deeper, and ultimately turbid.
9. A solution of isinglafs added to the same solution produces a precipitate, which is insoluble in boiling water, resembling in its essential properties the precipitate formed by the natural tannin.

Mr. Hatchett produced the same substance by treating various kinds of coal in the same way, such as pit-coal, coke, and animal charcoal. What may seem very curious, he formed it from the coal of one portion of isinglafs to precipitate another portion dissolved in water; and hence asserts that one portion of the skin of an animal may be employed to convert the other into leather.

Of the different substances employed, he found those the best which consisted of carbon unmixed with other vegetable matter, which always reduced the quantity; and that those vegetable substances which contained gum or mucilage, produced the least tannin.

When he succeeded in producing tannin from other vegetable substances, such as indigo, resin, lac, and many other bodies, it was by repeatedly adding fresh nitric acid; by which he very properly supposes that the carbon becomes separated, so as to put it under similar circumstances to the charcoal itself. Indigo produced the most in this way. At the commencement of his paper he mentions the fact of Mr. Chenevix having found that coffee-berries acquired, by roasting, a portion of tannin. He made some experiments which, although not very successful, convinced him that the chief characteristic properties of tannin may be formed or developed at some particular temperature and under favourable circumstances, by very simple means.

He ingeniously conjectures, that the tannin found in some varieties of peat has been produced in this way.

In making use of sulphuric acid to char various substances, he found that, in some instances, the artificial tannin, or a substance nearly resembling it, was formed. He first dissolved

100 grains of camphor in an ounce of concentrated sulphuric acid. The camphor first dissolved, without producing much change of colour. In a little time it became brown, and ultimately black. During this change, sulphurous acid gas was disengaged. After two days, during which time the alembic had not been heated, the disengagement of gas diminished, and the vessel was placed in a moderately heated sand-bath. This increased the action. At the end of two days, six ounces of cold water were added; the liquid changed to a reddish-brown colour; the disengagement of gas ceased, and was succeeded by a smell resembling a mixture of the oils of lavender and peppermint. By gradual distillation, the water came over impregnated strongly with the above odour, and accompanied by an essential oil, which weighed three grains.

When the whole water had come over, two ounces more were added. The smell before mentioned did not return, and the evaporation was continued to dryness. The blackish-brown residuum was not acted upon by water, but by several digestions with alcohol, leaving behind a compact coaly residuum, which, when dried and heated to a red heat in a close vessel, weighed 53 grains. The alcohol was then drawn off from the solution by distillation in a water-bath, leaving a blackish-brown mass, of the appearance of a gum resin, and the smell of calomel. Its weight was 49 grains. The whole of this therefore consisted of

The essential oil above-mentioned - - - -	3
A compact hard coal in small fragments - -	53
And the blackish-brown mass above-mentioned -	49
	105

This increase of five grains Mr. Hatchett attributes to the oxygen united to the carbon by the acid, or the water combined with the blackish-brown substance.

This latter substance had the following properties :

1. It had an astringent taste, and when dissolved in cold water, formed a dark-brown solution.
  2. It yielded a dark-brown precipitate with sulphate of iron, acetite of lead, muriate of tin, and nitrate of lime.
  3. It precipitated gold in its metallic state.
  4. It formed so complete a precipitate with a solution of isinglafs, that the liquid became colourless as water.
- The precipitate was nearly black, and was, like the other compounds of tannin and gelatine, insoluble in hot water.

Mr. Hatchett observes that although this substance possesses the general character of that obtained by the nitric acid with charcoal, yet it seems to act less powerfully upon skin. The precipitate, at the time of its formation, is more flocculent and less tenacious than that produced by the other process.

Mr. Hatchett supposes this difference may arise from the want of azote, which seems to exist in that produced by nitric acid and charcoal.

He ascertained this by subjecting to analysis a portion which had been prepared from vegetable charcoal. He exposed in a retort some of this tannin in the dry state, to the heat of a lamp connected with a jar, to obtain the gaseous product.

First a small quantity of water rose; then a little nitric acid, which had not been expelled in the evaporation. Next a small quantity of yellowish liquor, which stained the neck of the retort. The fire was then raised, when a quantity of gas was explosively disengaged, and upset the jar. This gas he judged from the smell to be ammonia. He also observed

# TANNIN.

observed some white fumes, which resulted from the nitric acid uniting with the ammonia.

On replacing the jar, he continued the process. The future gas which came over was carbonic acid, and a little of another, which he supposed to be nitrogen.

Although the artificial tannin appears in almost every respect similar to the natural tannin, it might be expected that each would have been similarly affected by nitric acid, yet Mr. Hatchett found that the one was destructible by that acid, while the other was not in the least affected by it. He frequently distilled nitric acid from the artificial tannin, without producing any change upon it.

The same acid being added to infusion of galls, sumach, Pegu cutch, and kascutti, completely destroyed the tannin. The common catechu and oak bark treated in the same way, had not the whole of their tannin destroyed. He then made infusions of equal strength of nutgalls, sumach, shavings of oak wood, oak bark, and the artificial tanning substances. To half an ounce of each of these, one drachm in measure of strong nitric acid was added. The tannin of all were destroyed, with the exception of the oak bark and the artificial tannin. Mr. Hatchett observes that the tannin of those bodies containing much mucilage is the most liable to destruction by the nitric acid; and that in the cases where the tannin is destroyed, the oxalic acid is mostly formed. The oak bark and the common catechu contain little or no mucilage, and hence have less of their tannin destroyed.

These facts seem to prove that pure tannin, unmixed with other matter, is not affected by nitric acid, and that in those instances in which it is destroyed, the effect must arise from some new substance being formed by the action of the acid upon the extraneous matter, and also that mucilage contributes the most to this change.

Mr. Hatchett has not given us any precise analysis of this substance, but concludes, from its formation, that it has carbon for its base. From the circumstance of its being formed with greater facility when the nitric acid is diluted, he thinks that the water is decomposed, and that the hydrogen enters into its composition.

In the case of its decomposition by heat, the formation of ammonia led him to believe that azote was also one of its elements.

This, however, does not agree with the fact of its being formed with sulphuric acid and vegetable matter only. Although this objection seems partly to be removed by the circumstance of the tannin from sulphuric acid being different in some of its properties from that produced from the nitric acid and charcoal, it may, however, be here observed that the natural tannin, which is not known to contain azote, more nearly resembles that formed with nitric acid, than that from the sulphuric acid.

It does not appear probable that azote is a component part, even of the natural tannin. The ammonia which Mr. Hatchett obtained might be in combination with the tannin, and may perhaps always be formed when the tannin is formed. The circumstance of the tannin not being changed by repeatedly digesting it with nitric acid, would seem to favour the idea of its consisting of carbon and oxygen only. The importance of this substance in the art of tanning, ought to be a sufficient stimulus to future experiments.

If in the process of forming artificial tannin, the nitric acid is decomposed merely into nitrous gas, it might be practicable to bring it back to its original state by the oxygen of the atmosphere only, and thus produce a valuable product, which is now obtained at considerable expence from certain vegetables.

The following table shews the proportions present of natural tannin in a variety of substances.

Catechu from Bombay	-	-	-	54.5
Bengal	-	-	-	48.5
Aleppo nutgalls	-	-	-	26
Sumach	-	-	-	18
Souchong tea	-	-	-	11
Green tea	-	-	-	9.2
Leicestershire willow bark	-	-	-	7.5
Oak bark	-	-	-	6.6
Spanish chefnut bark	-	-	-	5
Elm bark	-	-	-	3
Common willow bark	-	-	-	2.5

Mr. Biggin also has published, in the Philosophical Transactions for 1799, the result of some experiments on the proportions of tannin in various kinds of bark, which nearly corresponds with the preceding statement, as will be seen by the following table, in which the *maximum* of the tanning principle is supposed to be 20.

	Tanning Principle.	
	By the Hydrometer.	Weight in Grains.
Elm	2.1	28
Oak (cut in winter)	2.1	30
Horfe chefnut	2.2	30
Beech	2.4	31
Willow (boughs)	2.4	31
Elder	3.0	41
Plum-tree	4.0	58
Willow (trunk)	4.0	52
Sycamore	4.1	53
Birch	4.1	54
Cherry-tree	4.2	59
Sallow	4.6	59
Mountain ash	4.7	60
Poplar	6.0	76
Hazel	6.3	79
Ash	6.6	82
Spanish chefnut	9.0	98
Smooth oak	9.2	104
Oak (cut in spring)	9.6	108
Huntingdon or Leicester willow	10.1	109
Sumach	16.2	158

It appears from this table that similar barks, when taken from trees at different seasons of the year, differ as to the quantities of tannin contained in them. In the winter they contain the least, and in the spring (which is the usual time of felling oak-timber), if the season is very cold and ungenial, the quantity is diminished. This is well known to practical men, as likewise that all barks contain the greatest proportion of tannin; at the time when the buds of the trees begin to germinate. It is found by experience that, on an average, four or five pounds of good oak bark are required to form one pound of leather.

Sir Humphrey Davy observes that the astringent principles in barks vary considerably, according as their age and size are different. That in every astringent bark, the interior white bark (which is the part next to the alburnum) contains the largest quantity of tannin. The proportion of extractive matter is generally greatest in the middle; but the epidermis seldom furnishes either tannin or extractive matter. The white cortical layers are, comparatively, most abundant in young trees; and hence their barks contain, in the same weight, a larger proportion of tannin than the

## TANNING.

barks of old trees. (Phil. Trans. 1803, p. 264.) From these observations, founded on experiments, Mr. Hatchett infers that there is an intimate connection between the formation of new wood and the formation of tannin in such vegetables as afford the latter; and this idea is corroborated by the chemical nature of those substances.

It has been suggested that the extractive matter found in barks, or in substances used in tanning, affects the colour, if not the quality of leather. Thus, skin tanned with gall-nuts is much paler than skin tanned with oak bark, which contains a brown extractive matter. Leather made from catechu is of a reddish tint.

It is found that the precipitates obtained from infusions containing this principle or tannin by isinglafs, when dried, contain at a medium rate about 40 *per cent.* of vegetable matter; and that it is easy to obtain the comparative value of different substances for the use of the tanner, by comparing the quantities of precipitate afforded by infusions of given weights mixed with solutions of glue or isinglafs. In order to make experiments of this kind, an ounce or 480 grains of the vegetable substance in coarse powder, should be acted upon by half a pint of boiling water: the mixture should be frequently stirred, and suffered to stand twenty-four hours; the fluid should then be passed through a fine linen cloth, and mixed with an equal quantity of solution of gelatine, made by dissolving glue, jelly, or isinglafs in hot water, in the proportion of a drachm of glue or isinglafs, or six table spoons full of jelly, to a pint of water. The precipitate is to be collected by passing the mixture of the solution and infusion through folds of blotting paper, and the paper exposed to the air until its contents are quite dry. If pieces of paper of equal weights are used, in cases in which different vegetable substances are employed, the difference of the weights of the papers when dried, will indicate, with tolerable accuracy, the quantities of this principle or tannin contained in the substances, and their relative value for the purposes of manufacture.

**TANNING**, the art of converting the gelatinous part of the skins of animals into the substance called leather, by impregnating it with tannin or the tanning principle, in such a manner as to render it tenacious, durable, and impermeable to water.

It is difficult to say at what period the art of tanning was discovered. It was doubtless known to the ancients in some degree of perfection; and it is highly probable that the skins of animals were employed by man as a covering long before the art of tanning was known: but they would require in this state to be constantly kept dry, as moisture would soon bring them into a state of putrefaction.

The astringent matter, which converts the skin into leather, abounds in so many vegetables in every country, that accident would soon lead to some method of producing the change. Independent, however, of vegetables, many earthy and metallic substances have the property of rendering skins incorruptible to a certain extent; and some mineral waters containing copper or iron will occasion this change. Hence we may conclude that some means of giving preferation to the skins of animals must have been known at a very early period.

Though there has been no radical alteration or any great practical improvements in the art of tanning, yet for the last twenty or thirty years it has attracted the attention of many celebrated chemists and philosophers in all countries, who have investigated the subject with great accuracy and precision. Previous to this period we occasionally find some experiments and observations by men of science on the ma-

terials of tanning, as by the Hon. Charles Howard in 1674, (Phil. Trans. vol. ix.) by the abbé Nollet, Gefner, Gleditsch, Buffon, de la Lande, and others, in Mem. Acad. Sc. Paris and Berlin.

In the year 1765, the Society of Arts and Sciences in London granted a premium of 100*l.* for the discovery of a method of tanning with oak saw-dust; and in 1795 the Rev. G. Swayne suggested the use of oak leaves. It is unquestionably true that all those substances, and indeed every part of almost every vegetable in nature, possess a certain portion of the tanning principle; but, exclusive of oak bark and two or three other well-known articles, the quantities of all the rest added together would be so inconsiderable, and the proportion of tannin contained in them so inadequate to the purposes of manufacture, that, except for philosophical curiosity and chemical experiment, they are unworthy of notice. As the theories of speculative minds they are ingenious and amusing, but they afford very little useful information on the nature and properties of tannin, and have produced no beneficial results in practice.

Deyeux, about 1793, (Annales de Chimie, vol. xvii.) appears to be the first chemist who successfully explained the true principles of tanning; which afterwards, with more practical application, were still further developed by the labours of M. Seguin in 1795. Before his investigation of this subject, the theory of tanning was strictly mechanical. The astringency of vegetables, which produced the change in the skin, was considered as a resinous body, which had the effect of giving firmness to the fibres of the skin, and rendering it insoluble.

Seguin saw the operation in a chemical point of view: he examined the nature of the process scientifically, and discovered that the change which the skin underwent in the operation of tanning, was the result of a chemical union between a substance furnished by the vegetable employed, and the gelatinous part of the skin. These principles he confirmed, by combining the vegetable substance in question with the gelatine of a solution of isinglafs.

It will be seen, from our article **TANNIN**, that the compound discovered by Seguin, and which is precipitated when an infusion of nutgalls is added to a solution of isinglafs, is an insoluble substance, having many properties common to leather. See Nicholson's Journal, vol. i. p. 271. 4to.

The practice which M. Seguin founded upon his theory was generally admired. He first extracted the tannin from the vegetable, which was oak bark, and applied it to the prepared skin in a more concentrated form, with a view to impregnate it as speedily as possible with the tannin. This was said to be done with great success in one-third of the usual time, and to have produced superior leather. The fame of this discovery soon spread throughout Europe, and Mr. Desmond, a man of education and intelligence in this country, took out a patent for the exclusive right of using M. Seguin's method of tanning.

Although this process of suspending the hides vertically in a very strong solution of bark saved much time, yet it was soon found to be adapted only to the thickest hides used for sole leather, and quite unfit for the lighter kind of skins which required flexibility and tenacity. This method, therefore, of Seguin's, however chemical and philosophical it might appear, did not answer in the result; and as it was attended with much additional expence, has never been generally practised in England.

It was not, however, till 1803, when sir Humphrey Davy (a name ever to be recorded in the annals of science with gratitude and admiration) began to investigate the sub-

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ject, that the art of tanning was thoroughly understood, and reduced to scientific principles. He instituted a series of experiments on the various substances employed—examined their chemical affinities and agencies—their action upon animal matter, and combination with other bodies—and developed and explained the whole with a simplicity and perspicuity which forcibly elucidated the essential principles on which the art depends. If this elucidation has not been productive of any material improvements in the mode of manufacturing leather, it may perhaps be attributed more to the prejudices arising from long habit, than to any defect in the theory and demonstrations of that enlightened philosopher. And here it may be remarked, that these demonstrations and that theory derive additional importance, and are entitled to peculiar attention, from having been strongly confirmed and successfully practised by an intelligent and respectable manufacturer (now retired from business), to whom we are chiefly indebted for this article.

From these and other sources of information now open to the public, and from the general diffusion of knowledge among all classes, the man of science and the manufacturer are daily becoming more assimilated to each other; and if the latter should be taught to discard all unfounded prejudices, and to adopt more scientific principles, there is reason to believe that the various processes of the art of tanning may yet be capable of great practical improvement.

In the two valuable papers which sir Humphrey Davy has given in the Philosophical Transactions for 1803, he considers the process of tanning as depending simply on the chemical union of the tanning principle with the matter of skin, so as to form an insoluble compound. He has shown that Seguin's quick method of tanning is not the best; because the exterior strata of skin being perfectly combined with tannin, before the interior strata are materially acted upon, thereby prevent the latter in some degree from imbibing the full action of the solution. This renders the texture of the leather less equable, makes it harsh and brittle, liable to crack, and of course less durable.

Sir Humphrey thinks it probable that another substance, besides tannin, combines with the skin, namely, the extract, to which it owes much of its suppleness and tenacity—that the leather gets more of this substance from weak infusions of bark, than from the strong ones recommended by Seguin—that it is equally insoluble in water—and that, upon the whole, the methods now generally in use, may, with a few alterations, be considered the best.

The various discoveries pretended to have been made, and the numerous patents obtained for their use and application, have hitherto tended very little to the advancement of science or the progress of the art. This may fairly be inferred from the conclusion of the celebrated chemist above-mentioned. Indeed it appears by the specifications annexed to the patents, that most of these projected improvements purport to be either for the different construction and arrangement of the various pits—for the application of mechanical apparatus to diminish labour—or for extracting the tannin and warming the infusion by artificial heat, with a view to accelerate the process. These fancied improvements are only the idle theories and visionary projects of speculative minds: but as it may afford information to the curious, and furnish hints for future discovery, we subjoin

#### *A List of Patents for Tanning.*

1790. Anthony Fay, esq. of London, for a mechanical apparatus to diminish the labour of *handling*; to grind the

bark very small, and to concentrate it, by boiling, into a strong extract.

1794. Samuel Ashton of Sheffield, for tanning hides and skins with certain mineral productions. As such materials were prohibited by the statute of James I. an act of parliament was passed to legalize the use of them.

1795. Mr. Tucker of Wickham, Hants, for triple pits composed of wood, metal, and bricks, to keep up a constant fire at the bottom, to warm the infusion and expedite the process.

1796. William Desmond, esq. of London, for a new mode of tanning, according to M. Seguin's method, as before stated.

1797. Robert Crofs of Lancaster, for pits on a new construction, to enable him to apply artificial heat and to tan quickly.

1799. Francis Brewin, esq. of London, for a peculiar construction and arrangement of pits, and for the use of machinery, &c.

1802. John Lawrence, for the use of oak saw-duit in tanning.

1802. Thomas Martin of London, for constructing pits on a new plan, &c.

1802. John Cant and John Miller of Montrose, for boiling the bark, &c. so as to extract the tanning principle more effectually.

1807. Robert John Stanley of Lincolnshire, for tanning light leather without bark, for a peculiar preparation previous to the application of ooze, and for boiling the materials of tanning.

1813. Sparks Moline, for the use of the solid extract of bark.

1815. Thomas Ashmore, esq. for the use of all kinds of foot, whether from coal, wood, peat, or bones, and the oils and empyreumatic liquors arising from them by distillation or combustion, to be applied to the purposes of tanning.

Of the utility of the last-named patent, we shall give no opinion at present; but of the remainder it may be affirmed that none of the methods therein recommended have ever been much practised: some of them which were adopted by a few individuals, were attended with considerable loss; and as most of them are now laid aside, we may reasonably conclude that they have not proved beneficial to the projectors or to the public.

Before we describe the present method, it may be necessary to premise, that in different parts of the kingdom, the same terms and denominations are sometimes employed to designate distinct kinds of leather: but all tanned leather is technically classed and universally known under two general denominations; namely, *hides* and *skins*. The former term being commonly applied to the larger animals, as bulls, oxen, cows, &c. which are chiefly intended for the soles of stout shoes, and other purposes requiring very thick and solid leather; while the latter term is used for calves, seals, &c. which, being thinner and more flexible, are intended for the upper leathers of shoes and boots, for saddles, harness, &c.

The heaviest and stoutest of the bull and ox hides are generally selected to make what are technically called *butts* or *barks*, and are manufactured in the following manner.

When the horns, &c. have been removed, the raw hides are laid on a heap for two or three days, and are then suspended on poles in a close room, called a smoke-house, which is heated somewhat above the common temperature by a smouldering fire: this occasions incipient putrefaction, which

which loosens the epidermis, and renders the hair and other extraneous matter easy of separation from the true skin. This is effected by extending the hide on a wooden horse or beam of a convex form, and scraping it with a large two-handled knife, called a *fleshing-knife*, which is bent, to suit the convexity of the beam.

The hides are then immersed in a pit containing water slightly impregnated with sulphuric acid. This operation, which is called *raising*, by distending the pores and swelling the fibres, prepares the hide for the reception of the tannin, and renders it more susceptible of its action.

When the hides are sufficiently *raised*, they are removed into a pit, in which they are lain smooth with a stratum of oak bark ground to a coarse powder between each.

The pit is then filled with the tanning lixivium or ooze, prepared from oak bark and water, and the hides remain a month or six weeks without being moved. At the end of this time, the tanning principle being exhausted, the ooze and spent bark are taken out of the pit, and the hides put in again, stratified with fresh bark, and covered with fresh ooze as before. Here they remain about three months, when the same process is repeated, at about the same intervals, three several times or more, according to the strength of the lixivium and the substance of the hides. When sufficiently tanned, they are taken out of the pit, hung up in a shed to dry gradually, and being compressed with a steel instrument, and beaten smooth to render them firm and dense, the operation is complete; and having been numbered, weighed, and stamped by the excise officer, to ascertain the amount, and denote the payment of the duty (which will be noticed at the end of this article), they are ready for sale, and are termed *butts* or *backs*. These form the thickest and most substantial sole leather for very strong shoes, and are chiefly intended for exportation.

*Crop hides* are thus manufactured. The horns having been removed, the hides are immersed in pits containing a mixture of lime and water, where they remain three or four days, being occasionally moved up and down, that each part may be uniformly exposed to the action of the lime-water. They are then taken out of the lime-pits, and the hair and other extraneous matter being scraped off on a wooden beam, as before described, are washed in water, to free them from the lime and filth adhering. They are now immersed in a weak ooze, and by degrees are removed into other pits, containing solutions gradually increasing in strength, during which time they are taken up and put down (technically termed *handling*) at least once in every day, that all parts of the hide may be acted upon by the tanning principle equally and uniformly. This is continued for about a month or six weeks, when they are put into other pits with stronger ooze and a small portion of ground bark; from whence, as the tannin becomes exhausted, they are removed to other pits in regular succession, with fresh ooze and fresh bark, for two or three months.

At the end of this period, the hides are put into larger vats, called *layers*, in which they are stratified, or lain smooth, in a lixivium of greater strength, and with a larger quantity of ground bark between each fold. Here they remain about six weeks, when they are taken up and relaid in the same manner, with fresh bark and strong ooze, for two months. This process is repeated, with little variation, once, twice, or thrice, at the discretion of the manufacturer, till the hides are thoroughly tanned; when they are taken out of the pits, suspended on poles to dry, and being compressed and smoothed, nearly in the manner before described, are called *crop hides*, and form the principal part of the sole leather which is used in England.

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The process of tanning *skins* (calves, seals, &c.) is somewhat different from *hides*. They are continued in the lime-pits for ten or fifteen days; they are then depilated and washed in water, after which they are immersed in an infusion of pigeon's dung, called a *grainer*, having the property of an alkali. Here they remain for a week or ten days, according to the state of the atmosphere and other circumstances, during which time they are frequently *handled*, and scraped on both sides upon a convex wooden beam. This scraping, or *working*, as it is termed, with the action of the *grainer*, helps to discharge all the lime, oil, and saponaceous matter, and renders the skin soft and pliant, fitted to imbibe the tanning principle. They are now removed into pits containing a weak solution of bark, where they undergo nearly the same process of handling, &c. as *crop hides*; but they are seldom stratified in *layers*; and the time occupied in tanning them is usually from two to four months, according to their nature and substance. The skins are then dried, and sold to the currier, who dresses and blacks them for the upper leathers of boots and shoes, for harness, and various other purposes.

The light and thin sort of cow-hides and horse-hides undergo nearly the same process in tanning as calf-skins, and are applied to similar uses.

These processes are such as are now commonly practised, varying, however, with the nature and condition of the peculiar kind of hides and skins—with local habits and circumstances—and with the skill and experience of the manufacturer. The greatest defect in the common methods appears to exist in the means of extracting the tannin from the bark. Cold water is chiefly used for that purpose; but some persons conceiving that this does not entirely exhaust the tanning principle, subject the bark, as before observed, to the action of boiling water, &c. If, however, as sir Humphrey Davy has stated, the extract as well as the tannin combines with the skin, the extraction of the tannin by heat would tend to oxygenate the former, and render it insoluble in the liquid.

The late ingenious Dr. Macbride of Dublin invented and published in 1778 a new method of tanning, the leading feature of which was the use of lime-water, which he conceived would extract the virtues of oak bark more completely than plain water.

It has, however, been observed, that both natural and artificial tannin form compounds with the alkalies and the alkaline earths, and these compounds are not decomposable by skin. Lime forms with tannin a compound not soluble in water, and therefore Dr. Macbride's system is founded on erroneous principles, as so much of the tannin as combined with the lime contained in the water was lost. It was also found, by the practical experience of tanners, that this method was in all respects injurious rather than beneficial; and as it has long been universally rejected, it is not necessary to enter into the detail. The reader who is desirous of further information on this point, may refer to Phil. Trans. vol. lxxviii. part i. art. 8.

The application of some new and cheap substitute for oak bark has been long a desideratum in tanning. Catechu, the substance we have spoken of under the article TANNIN, has been recommended, and its powerful tanning properties have been fully ascertained by experiment and actual practice: but it is not likely that the article can be procured in sufficient quantity, or at an adequate price, for the purposes of manufacture. The bark of elm, willow, larch, and other trees, together with *vallonia* (the acorn of a peculiar species of oak in Turkey), have all been employed in tanning with considerable effect.

The greatest hope which chemical science presents, is the

probability that the tanning principle will, at some future period, be formed artificially in such quantities and at such expense as will admit of its general application to practical purposes. The important discovery of Mr. Hatchett already goes far towards the accomplishment of this object. He has distinctly ascertained that a substance very analogous to tannin may be produced by exposing carbonaceous matter, whether vegetable, animal, or mineral, to the action of nitric acid; and has actually converted skin into leather by deal saw-dust, asphaltum, pit-coal, wax-candle, and even by a part of the same sort of skin itself. The changes produced in these bodies, by disuniting and recombining their elementary principles, may by further development lead to a more economical process of tanning, and thus render essential service to the arts and manufactures.

Tanned leather is subject to a very heavy excise duty. In the ninth year of queen Anne, a duty of *1d. per lb.* was laid on all hides and skins tanned in Great Britain. In the following year an additional  $\frac{1}{2}d.$  *per lb.* was imposed. Thus it remained, amidst all the financial difficulties of successive chancellors of the exchequer, till 1812, when, by the act 52 Geo. III. c. 94. a further duty of  $1\frac{1}{2}d.$  *per lb.* was added, making the whole duty on tanned hides and skins *3d. per lb.* The annual revenue arising therefrom now amounts to upwards of 500,000*l.*

It may not be improper here to remark, that the excise duty on leather tanned in Ireland, is levied and collected in a different manner.

The act 40 Geo. III. c. 9. passed in Ireland in 1800, instead of imposing a certain duty *per pound weight*, as in England, on all hides and skins tanned with oak bark, imposes a duty of nine pence by the year, for every cubic foot contained in all the pits in the yard of the tanner, allowing a deduction of two-ninths for certain pits called *latches*, which are used solely for the purpose of preparing the lixivium or ooze. By this act the tanner was permitted, on giving certain notice, to discontinue not less than one-fourth, and by 43 Geo. III. c. 97. not less than one-eighth for six months, receiving a proportionate deduction from his monthly payments of the duty. By the 48 Geo. III. c. 62. those acts were made perpetual.

Previous to the passing the Irish act 40 Geo. III. the writer of this article was consulted by the then chancellor of the exchequer in Ireland, on the relative amount of the intended duty of nine pence *per cubic foot*; and upon accurate calculation it was found to bear a fair proportion to the duty then existing in England. If the present duty on leather tanned in this part of the united kingdom were proportionably commuted on a similar plan, it would materially tend to the progress of the manufacture.

The chief obstacle to great practical improvement is the excise duty—not so much from its amount (though that is very considerable), as from the mode in which it is now levied and ascertained, namely, by weight, when the leather is dry and fit for sale. This mode necessarily requires a system of rules and regulations, which, from their multiplicity and complicated nature, subject the manufacturer to daily inconvenience, and to occasional hardships. For, notwithstanding the repeal of the oppressive act 1 James I. cap. 22, and other subsequent statutes, the tanner is still restricted, by various excise laws, from advantageously shaving and reducing his hides and skins—from mixing and removing them at his discretion—and also from exercising the trades of a currier, &c.

Those restrictions, it must be acknowledged, are in some degree necessary for the protection and security of the revenue, while the duties are imposed and collected upon the present

system. But if a different mode of taxation and collection (as in Ireland, on the admeasurement of the pits; or on the raw material, or any other plan) could be adopted, the benefits which would result, both to the manufacturer and to the community, are incalculable. It would leave the tanner at full liberty to conduct his business entirely according to his skill and judgment, and to unite with it the trades of currier and leather-cutter, which are so naturally connected with his own. It would enable him to facilitate the process; to save much superfluous labour; to economize the materials of tanning, which are now unavoidably wasted on useless or inferior leather; to shave, divide, select, and appropriate certain hides and skins, or parts of hides and skins, at the proper time for their peculiar purposes; to prevent the injury which leather often receives in drying at particular seasons; and ultimately to improve the quality and reduce the price of one of the most useful articles of general consumption.

These are matters well worthy the consideration of the executive government and the legislature. Some attention has already been given to this subject by the house of commons in the sessions of 1815 and 1816, and we have no doubt that by further investigation, intelligent and unprejudiced persons might easily arrange and complete a plan which would afford perfect security to the revenue, would simplify the collection, would prevent the possibility of fraud, and at the same time prove extremely beneficial to the manufacture and to the public.

TANNRODA, in *Geography*, a town of the principality of Weimar; 9 miles S.S.W. of Weimar.

TANORE, a town of Hindoostan, in the country of Calicut; 25 miles S.S.E. of Calicut. N. lat. 10° 58'. E. long. 75° 54'.

TANOS, in *Ancient Geography*, a town of the island of Crete.

TANOT, in *Geography*, a river of North Wales, which rises in the county of Montgomery, and runs into the Severn, 7 miles below Welshpool.

TANOUMDAIN, a town of the Birman empire; 30 miles N.E. of Pagahm.

TANREC, in *Zoology*, a name given by Buffon to the *ERINACEUS Ecaudatus*; which see.

TANSA, in *Geography*, a branch of the river Mobile.

TANGIA. See TANGIA.

TANSE, a town of Brasil, in the jurisdiction of St. Paul.

TANSIFT, or TENSIFT, vulgarly called Wed Marakosh, or the river of Morocco, because it passes through the district of that name, a river that rises in mount Atlas, E. of Morocco, and taking its course about five miles N. of that city, proceeds through the territory of Morocco, and Rahamana, and nearly divides the two maritime provinces of Shedma and Abda; discharging itself into the Atlantic ocean, about 16 miles S. of the town of Sassy. In its course it receives some tributary streams issuing from the Atlas, the principal of which is the Wed Niffis. In many places it is very deep; and about six miles from Morocco it is crossed by a bridge, erected by Muley El Mansor, which is very strong, but flat, with many arches. At the mouth of this river, on the N. side, amid some sands and marshes, are the ruins of a small town, called by the Moors Suera, from which the insalubrity of the air, or the inundations of the Tansif, have driven the inhabitants. On the other side of the river, which is passed by fording, or on rafts made of reeds tied to leathern bags inflated with wind, is a square castle, built in the reign of Muley Ishmael, to defend the passage of the river, during the time of the intestine disturbances of the empire. This castle at present only contains a few families; and the country round it is uncultivated.

**TANSILLO, LUIGI**, in *Biography*, an Italian poet, was a native of Nola, and born about the year 1510. The first specimen of his talents in Tuscan poetry, when he was twenty-four years of age, was his "Il Vandemmiatore," first printed in 1734, and it afterwards passed through several editions, under the title of "Stanze amorose sopra gli orte della Donne." This poem was succeeded by another of the same licentious character, entitled "Stanze in lode della Menta." His reputation was so much sunk by these publications, that all his poems and other pieces were consigned by pope Paul IV. to the list of prohibited books. The author, deeply mortified by this circumstance, addressed a penitential letter to the pope, supplicating forgiveness, and informing him that he had made reparation by composing a devout poem, entitled "Le Lagrime di San Pietro," or, "The Tears of St. Peter." The apology was admitted, and his name was erased from the list. In 1569 he was judge-royal at Gæta, and being then declining in health, he probably did not long survive. His "Tears of St. Peter" was published, after his death, in fifteen cantos, and much applauded. It was translated into French by Malherbe, and also into Spanish. His other poems have been often printed; but the most complete edition is that of Venice in 1738. Two other elegant poems, entitled "La Balia" and "Il Podera," were published in the year 1767 and 1769. Some persons have represented Tansillo as equal to Petrarch; but though this degree of praise should not be allowed, he is considered by the best judges as one of the most elegant and spirited poets of his age. Moreri. Gen. Biog.

**TANSITARO**, in *Geography*, a town of Mexico, in the province of Mechoacan.

**TANSOR**, a town of Africa, in the kingdom of Fez, 30 miles N. of Fez.

**TANSOU**, a town on the E. coast of Madagascar. S. lat. 15° 40'. E. long. 50° 8'.

**TANSUCHE**, a town of Mexico, in the province of Guafteca; 83 miles N.W. of Panuco.

**TANSY**, or **TANZY**, in *Botany*. See **TANACETUM**.

**TANSY**, in the *Materia Medica*. The leaves and flowers of tansy have a strong, not very disagreeable smell, and a bitter somewhat aromatic taste. They give out their virtue both to water and spirit, but most perfectly to the latter: the tincture made from the leaves is of a fine green; from the flowers, of a bright pale yellow colour. Distilled with water, they yield a greenish-yellow essential oil, smelling strongly of the herb, and probably containing camphor; the remaining decoction, inspissated, affords a strong, bitter, subsaline extract.

According to Bergius, the virtues of tansy are tonic, stomachic, anthelmintic, emmenagogue, and resolvent, qualities usually attributed to bitters of the warm or aromatic kind. Tansy has been much used as a vermifuge, and its efficacy has been ascertained by the testimonies of many respectable physicians.

The seeds have been chiefly recommended in this last intention, and substituted for those of the *santonicum*, from which they differ not a little in quality as well as in appearance, being much less bitter, and of a more aromatic flavour.

Dr. Clark informs us (*Ess. and Obs. Phys. and Lit.* vol. iii.) that in Scotland tansy was found to be very beneficial in various cases of gout, and Dr. Cullen says, that he has known several who have taken it without any advantage, and some others who reported that they had been relieved from the frequency of their gout. Tansy is also recommended in the hysteria, especially when this disease is supposed to proceed from menstrual obstructions.

The leaves of this plant may be given in powder to the quantity of ʒj to ʒj, for a dose twice a day; but it has been more commonly taken in infusion, or drank as tea. It is now scarcely ever used, except as an anthelmintic for expelling lumbrici, to which it has certainly some pretensions. Lewis. Woodville. Thomson.

**TANSY**, *Willd.* See **CINQUEFOIL**.

**TANT**, in *Natural History*, an English name for a small spider of the *phalangium* kind, having only two eyes, and eight very long legs, and commonly supposed to be very poisonous.

It is all over of an elegant scarlet colour, resembling that of the flowers of the red poppy when full blown, except that the belly has a whitish cast. Four of its legs are inserted in the upper part of the breast, and the other four near the belly; and near the origin of each leg there is a small black spot. Its body is round and full, and it is all over covered with a fine, short, velvety down. It is not unfrequent in dry pastures in the spring-season. It is terribly dreaded by our farmers, who suppose that an ox will die who chances to swallow it. Ray's Hist. Insects, p. 44.

**TANTABEE**, or **TANKABAST**, or *Lop*, in *Geography*, a town of Little Bucharia, on the river Yarkan; 100 miles S. of Tourfan.

**TANTALAM**. See **LIGOR**.

**TANTALITE**, in *Mineralogy*, the ore of a newly discovered metal called tantalum, or tantalum. (See **TANTALIUM**.) This ore has been called columbite by Mr. Hatchett, who obtained a specimen of it from Massachusetts bay, in North America, and discovered the metal which he denominated columbium, and which is now found to be the same with tantalum. The colour of tantalite is iron-black, sometimes with a tinge of blue. It occurs imbedded in angular pieces, from the size of a pea to that of an hazle-nut. It is also crystallized in acute octohedrons, with square bases. The surface of the angular pieces is uneven; that of the crystals is sometimes smooth, and sometimes streaked; it has a shining metallic lustre, inclining to resinous. The fracture is uneven and granular, inclining to compact or conchoidal. The fragments are irregular, sharp, and angular. It scratches glass, and gives a few sparks with steel. The streak is dull, and the powder a brownish-black. The specific gravity varies from 7.15 to 7.953. The columbite, according to Hatchett, is 5.918. Tantalite is infusible before the blow-pipe, without addition; and it suffers no change but a diminution of lustre.

The constituent parts of tantalite from Finland are, according to

	Wollaston.	Vauquelin.	Klaproth.	Berzelius.
Oxyd of tantalum	85	83	88	83.2
Oxyd of iron	10	12	10	7.2
Oxyd of manganese	4	8	2	7.4
Oxyd of tin	0	0	0	0.6

The North American columbite contained, according to an analysis of Dr. Wollaston, 80 parts of oxyd of tantalum, 15 of oxyd of iron, and 5 of oxyd of manganese.

Tantalite occurs in the parish of Kemito, in Finland, disseminated in coarse red granite. It bears a considerable resemblance to several other minerals, particularly to magnetic iron-stone, tin-stone, wolfram, yttryotantalite, and gadolinite. It is distinguished from magnetic iron-stone by its greater specific gravity, and by not affecting the magnetic needle; from compact black tin-stone, by its metallic lustre, and by the action of the blow-pipe, which reduces tin-stone on charcoal; from wolfram, by the absence of the foliated fracture; from yttryotantalite, by the form of the

crystals, and by resisting the action of the blow-pipe, by which yttriotantalite is melted into a greenish-yellow slag; lastly, tantalite is distinguished from gadolinite, by its greater specific gravity, uneven fracture, and infusibility. Yttriotantalite, another ore of tantalum, contains the newly discovered earth called yttria, from Ytterby, near Roslagen, in Sweden, where it was first discovered. See TANTALIUM and YTTRIOTANTALITE.

TANTALIUM, or TANTALUM, the metal obtained from tantalite and yttriotantalite. The method of reduction consists in boiling the ores with alkalies, and adding nitro-muriatic acid to the solution. The oxyd of tantalum is thrown down in white powder: this must be washed, dried, and strongly ignited in a crucible lined with charcoal.

Berzelius pressed the oxyd into a cavity of the size of a goose-quill, made in a lump of well-burned charcoal, and exposed it to a violent heat, in a Hessian crucible. The reduced metal was not melted, but the particles of it firmly adhered together, and formed a mass, through which water would not penetrate. The grains were hard enough to scratch glass. The specific gravity, as ascertained by Dr. Wollaston, was 5.61; but as the mass had not been melted, the weight of tantalum must be something heavier. Its colour is dark grey: and when scratched with a knife, it assumes the metallic lustre, and has the appearance of iron. It may be reduced to powder by trituration; the powder is of a dark brown colour, without the smallest metallic lustre. This powder is not in the least altered by muriatic or nitric acids, nor by aqua regia, though it be digested with them for several days. In this respect it agrees with chromium, titanium, osmium, iridium, and rhodium.

When heated to redness, it takes fire, burns feebly without flame, and goes out directly if it be removed from the fire. By this means it is converted into a greyish-white matter, which may again be reduced to the metallic state by heating it with charcoal: 100 parts of tantalum, treated in this manner, combine with 8.5 or 4.5 of oxygen. But by this process it is scarcely possible to oxydize tantalum completely.

If tantalum, when pulverized, is mixed with nitre, and thrown into a red-hot crucible, a feeble detonation takes place. The mass is snow-white, and is a compound of potash and oxyd of tantalum.

The mean of four experiments on the reduction of the oxyd of tantalum to the metallic state, makes it a compound of 100 metal with 5.485 oxygen. The supposition that the oxygen in the water, which converts the oxyd into a hydrate, is twice as great as that in the oxyd, would make it a compound of 100 metal with 5.5 oxygen. Muriatic acid throws down oxyd of tantalum, from its combinations with potash: it is then a hydrate of a white colour; and when washed and dried, it is composed of 100 of oxyd of tantalum and 12.5 water. From experiments of Berzelius, it appears that the oxyd of tantalum possesses acid properties. He succeeded in alloying several metals with tantalum, as tungsten and iron. Thomson's *Annals*, September, 1816, p. 233.

TANTALUS, in *Ancient Geography*, a town in the isle of Lesbos.—Also, a town in Asia Minor, upon the bank of the Meander.

TANTALUS, one of the many names given by chemists to mercury.

TANTALUS, in *Mythology*, a king of Lydia, Phrygia, or Paphlagonia, according to some, but, according to others, the son of Jupiter by the nymph Pluto, who is said to have presented the mangled members of his son Pelops, whom he murdered, to the gods, at a feast, in order to prove their divinity; or, according to the modern explication of this tale, he offered up his son as a sacrifice to the gods.

Others, however, have charged him with revealing the secrets of the gods, *i. e.* the mysteries of their worship, of which he was the high-priest. But whatever was the nature of his crime, the poets represent him as condemned to hell, and tormented there with perpetual hunger and thirst in the midst of plenty of both meat and drink. Some represent him as standing up to the chin in water, which he was incapable of reaching; or as standing under a tree, some of the branches of which, loaded with the finest ripe fruits, hung down just before his mouth, which, the moment he endeavoured to take, always waved out of his reach. Others represent him as standing under a heavy stone, which was suspended over his head, and which he suspected would every moment fall and crush him.

Horace (lib. i. sat. i. v. 71.) seems to make Tantalus only an emblem of the covetous: as Lucretius (lib. iii. v. 1015.) makes Sisyphus, who is represented as bending under the weight of a great stone, or labouring to heave it against the side of a steep mountain, and which always rolls precipitately down again before he can fix it on the top, as an emblem of the ambitious.

TANTALUS, in *Ornithology*, a genus of the order of Gallæ. Its characters are, that the bill is long, thick at the base, and somewhat incurvated; the face naked; the tongue short and broad; the nostrils linear; and the feet, with four toes, palmated at the base. Linnæus enumerates twenty-one

#### Species.

LOCULATOR. With a blueish face, reddish bill, quills and tail-feathers black, and white body: the curicaca of Maregrave, the wood peccan of Catesby, and wood ibis of Pennant. It is found in New Holland and South America.

FALCINELLUS. With a black face, blueish legs, wings and tail violet, and chestnut body: the bay ibis of Pennant and Latham, and green courlis of Buffon. A variety is the numenius castaneus of Brisson. It is found in flocks about the lakes of Italy, south of Germany, Denmark, the Ural desert, and the Caspian and Euxine seas.

MINUTUS. With face, bill, and legs greenish, ferruginous body, beneath white: the lesser ibis of Edwards and Latham. Found in Surinam.

IBIS. With red face, luteous bill, grey legs, black quill-feathers, and reddish-white body: the Egyptian ibis of Latham. Found plentifully in Egypt. See IBIS.

RUBER. With face, bill, and legs red, sanguineous body, and the apices of the wings black: the gannet of Maregrave, Willughby, Ray, &c. and the scarlet ibis of Pennant and Latham. Found gregarious in the Bahama islands, in parts of America between the tropics, particularly East Florida.

ALBUS. With red face, bill, and legs, white body, and the tips of the wings green: the white curlew of Catesby, and white ibis of Pennant and Latham. Found in the Brazil and in Carolina.

FESCUS. With red face, bill, and legs, brown body, beneath white: the brown curlew of Ibis, and brown ibis of Pennant and Latham. Found in the warmer parts of America, and in summer in Carolina.

VIRIDIS. With black face and legs, green and cyaneous wings, neck cinereous-black, beneath fasciated with white, upper part of the body and tail green-golden, beneath and rump brown-blackish: the green ibis of Latham.

IGNEUS. With black head and neck, green legs, body cyaneous, resplendent with green, beneath blackish-red, with the quills and tail-feathers green-golden: the glossy ibis of Latham.

LEUCO-

**LEUCOCEPHALUS.** With white head, neck, and body, bill and face yellow, legs pale, and rump with very long rufous feathers: the white-headed ibis of Latham. Found in Ceylon.

**CALVUS.** With white head, the hinder part of the neck tuberculated, with the jugular bag bare, the crown, bill, and legs black, and body black: the bald ibis of Latham. Found in the western parts of Africa.

**MANILLENSIS.** With the bill and orbits greenish, legs vermilion-coloured, and body red-brown: the Manilla ibis of Latham. Found in the island of Luçon.

**CRISTATUS.** With pale face, head, part of the neck, tail, and vent black, the crest on the hinder part of the head long with feathers partly white and partly black, ferruginous body, and whitish wings: the crested ibis of Latham. Found in Madagascar.

**NIGER.** With face, bill, and legs red, and black body: the black ibis of Latham. Found in Egypt, near Damietta.

**COCO.** With face and bill yellow-fleshy, legs fleshy pale, body white, wings as far as the apex white, the three outer quill-feathers black above at the apex. Found in the Caribbee islands.

**PILLUS.** With face, bill, and legs brown, body white, quill and tail-feathers black. Found near the rivers and lakes of Chili.

**CAYENNENSIS.** With face obscurely reddish, obscure bill, body black and shining green: the Cayenne ibis of Latham.

**MEXICANUS.** With blueish bill, reddish face, head and neck obscure and white, a little varied with green and yellow, back, rump, and legs black, breast and abdomen brown, tail and quill-feathers brassy-green: the acalotl of Ray and Willughby, the acalot of Buffon, and the Mexican ibis of Latham. Found near the lakes of New Spain.

**MELANOPIS.** With bill, face, and nails black, crown yellow, neck and breast yellowish, the feathers of the back, the scapulars, and tail-feathers, and pectoral band, cinereous, brown at the margin, the eyes and tail green and black, and the legs red: the black-faced ibis of Latham.

**ALBICOLLIS.** With black bill, head and neck rufous-white, body brown with grey waves and shining green, and red legs: the white-necked ibis of Latham. Found in Cayenne.

**GRISEUS.** With spadiceous bill, face and nails black, hind part of the head and neck grey, body whitish, back, rump, quills, and tail greenish-black, and reddish legs: the grey ibis of Latham, and matuiti of Willughby and Buffon. Found in Brasil.

**TANTALUS's Cup,** in *Hydraulics*, is a cup, as A (Pl. VIII. *Hydraulics*, fig. 6.) with a hole in the bottom, and the longer leg of the siphon B C E D cemented into the hole; so that the end D of the shorter leg D E, may almost touch the bottom of the cup within. Then, if water be poured into this cup, it will rise in the shorter by its upward pressure, extruding the air before it through the longer leg; and when the cup is filled above the bend of the siphon at F, the pressure of the water in the cup will force it over the bend of the siphon; and it will descend in the longer leg C B G, and even through the bottom, until the cup be emptied. The legs of this siphon are almost close together, and it is sometimes concealed by a small hollow statue, or figure of a man placed over it; the bend F being within the neck of the figure as high as the chin. So that poor thirsty Tantalus stands up to the chin in water, according to the fable, imagining it will rise a little higher, and he may drink; but, instead of that, when the water comes up to his chin, it immediately begins to descend, and therefore, as he cannot

floop to follow it, he is left as much tormented with thirst as ever.

**TANTAMOUNT,** something that amounts to, or is equivalent to, some other.

**TANTANEH,** in *Geography*, a mountain of Africa, which forms the south boundary of Berdoa.

**TAN-TCHING,** a town of Corea; 33 miles W.S.W. of Tin-tcheou.

**TANTECO,** a town of Mexico, in the province of Guafteca; 25 miles N. of Panuco.

**TAN-THOU-TCHING,** a town on the W. coast of the island of Formosa. N. lat. 25° 8'. E. long. 120° 49'.

**TANTRA,** the name of a branch of literature among the Hindoos, of which we have hitherto received but very imperfect information. The books bearing this title appear to contain directions for certain religious usages adopted by some sects and condemned by others. (See SAKTA.) The name Tantra, or Yantra, is also given to mysterious hieroglyphics, sacred to particular deities. See MANTRA, YANTRA, and PARUSHA.

**TANTUM DECIES.** See DECIES.

**TANTUMQUERI,** in *Geography*, a town of Africa, in the country of Fantin, on the Gold Coast, with two forts, one belonging to the English, the other to the Dutch. N. lat. 5° 20'. W. long. 2° 54'.

**TANTUR.** See TORTURA.

**TANUM,** a town of Sweden, in West Gothland; 32 miles N.W. of Uddevalla.

**TANUO,** a town of Peru, in the archbishopric of Lima, and jurisdiction of Cagnete.

**TANURI,** a town of Sweden, in the government of Bahus; 30 miles N.N.W. of Uddevalla.

**TANUS,** in *Ancient Geography*, a river of Greece, in the Peloponnesus, which had its source in mount Paron, traversed the Argolide, and discharged itself into the gulf of Thyraea.

**TANXIPA,** in *Geography*, a town of Mexico, in the province of Guafteca, at the foot of a mountain; 70 miles N.N.W. of Panuco.

**TANYGONG,** a town of Hindoostan, in Berar; 36 miles W. of Nagpour.

**TANZIPAO,** a river of Louisiana, which runs into Pontchartrain lake, N. lat. 30° 18'. W. long. 90° 10'.

**TANZU,** a town of Africa, in Angola, near the coast; 20 miles S.W. of Loando.

**TANZY,** in *Botany*, &c. See TANACETUM and TANSY.

**TAOCE,** in *Ancient Geography*, a town of Asia, in the interior of the Perside, near the town of Orebatis.—Also, a promontory of Asia, on the coast of the Perside, 500 stadia from the mouth of the river Oroatis, and 700 stadia from that of the river Rhogomagus.

**TAOCENA,** a country of Asia, in the Perside.

**TAOCHI,** a people of Asia, in the mountains of Armenia.

**TAO-LOU-SAC,** or TA, in *Geography*, a town of Lower Canada. N. lat. 48° 5'. W. long. 69° 30'.

**TAONABO,** in *Botany*. See TONABEA and TERNSTROMIA.

**TAONEROA,** in *Geography*. See POVERTY Bay.

**TAOO ISLAND,** one of the Friendly islands, in the South Pacific ocean, about 24 miles in circumference.

**TAOOK,** a town of Curdistan, situated in a barren country, N. of an extensive vale, which is about 20 miles over, and has a chain of mountains on each side, running E. and W.

**TAORMINA,** the ancient *Tauromenium*, a town of Sicily, in the valley of Demona, situated on the E. coast,

on a narrow level above a precipice of mount Taurus, and overhung by immense masses of rocks. According to Swinburne it contains 3000 inhabitants. It has been much celebrated for its costly marble and excellent wine. The ancient Tauromenium was much more extensive than the present town, and comprehended within its walls the town of the promontory of St. Andrew, where was a theatre placed between two high rocks, and commanding a full view both of *Ætna* and of the plains. This theatre is reckoned the most beautiful monument of antiquity extant. A considerable portion of this building has escaped the ravages of time, and affords the antiquary, as well as the architect, an opportunity of examining that division of a theatre on which the actors stood; a part that is wanting in almost all other ruined theatres. The arcades are all composed of brick, the rest of the walls of pebbles, and covered with casings of marble. The whole range of the vomitoria and galleries that encircled the seats is yet standing as high from the ground as the bottom of the second order; the proscenium, which formed the chord of the arch, is almost entire; it is a thick wall, with a large opening in the centre, and three niches; a small door, and a fourth niche on each side; between each of these apertures, or recesses, are marks in the wall, where columns were placed. According to the plan deduced from these ruins, the stage was a parallelogram of 138 feet by 58; on each side was a lofty square building, consisting of a basement and two upper stories, from the highest of which a communicating gallery was carried along the back scenes: the diameter of the semicircular part of the theatre, where the audience sat, was 142 English feet. The streets of the modern town, the courts and houses, are every where interspersed with fragments of antique walls, aqueducts, and mosaic pavements. The ascent to Taormina is very steep and difficult; but the charms of the landscape amply recompense the labour of attaining the height. Every thing belonging to it is drawn in a large sublime style; the mountains tower to the clouds; the castles and ruins rise on weighty masses of perpendicular rock, and seem to defy the attacks of mortal enemies; *Ætna*, with all its snowy and woody sweeps, fills half the horizon; the sea is stretched out upon an immense scale, and occupies the remainder of the prospect. The beach is confined by high cliffs, that are calcareous and consisting generally of a species of red and white marble, which was in high esteem among the ancients. The houses in the vicinity are inhabited by peasants, who occupy them with their children and cattle. These several monuments are undoubtedly coeval with the Romans; that is, posterior to Cæsar, who, having expelled the inhabitants of Tauromenium, placed in it a Roman colony. The origin of this city is lost in the obscurity of ages. It is known that it was considerably augmented, when Dionysius, in the 94th Olympiad, 443 years B.C., having taken and destroyed Naxos, caused it to be deserted by its inhabitants, who settled here. This proud city was at length destroyed by the Venetians, and fortified by the Norman conquerors; and it still exists in a reduced state. When it was taken by the Saracens from the Greek emperor in the 10th century, it was one of the strongest places in the island, and called by them "Al Moezzia," which name it retained for a considerable time; 27 miles S.S.W. of Messina. N. lat.  $37^{\circ} 51'$ . E. long.  $15^{\circ} 23'$ .

TAOS LAPIS, the *peacock-stone*, a name given by some of the ancient writers to a very beautiful variegated agate, resembling, in some degree, the great variety of colours in the peacock's tail.

TAOSANLU, in *Geography*, a town of Asiatic Turkey, in Natolia; 20 miles N.W. of Kiutaja.

TAOUKA, one of the Society islands, in the South Pacific ocean. S. lat.  $14^{\circ} 30'$ . W. long.  $145^{\circ} 9'$ .

TAP, among *Hunters*. A hare is said to tap, or beat, when she makes a particular noise at rutting-time.

TAP. See TAPPING.

TAP-Root, that sort of root which shoots directly downwards to a great depth. There are many roots of this nature, which are in constant use by the farmer, such as the carrot, parsnip, beet, &c.; and there are many plants of the tree kind which have tap-roots, as the oak, &c.: See TAPPING.

In the vegetable kinds of tap-rooted plants, they all require a deeply broken-down and prepared soil, in order to grow them with any success, and to any considerable sizes. And, as in the tree sorts, they must always rise from the feeds where they are sown; as they cannot be transplanted out with any kind of propriety or advantage. Where the land is not properly prepared to a suitable depth, they are usually short, forked, and of awkward growth; and when raised by transplanting, very small and stunted; but some of them cannot be at all grown in the last method.

TAP-Root'd Turnip, in *Agriculture*, that sort which grows much with this kind of root. It is not a favourable kind of growth for this sort of crop. See TURNIP.

TAPACRI, in *Geography*, a town of Peru; 20 miles N.E. of Cochabamba.

TAPAJOS, a river of Brazil, in the Capitania of Matto Grosso, which runs N. between the Madeira and the Chingu for 300 leagues, flowing into the Amazons, in lat.  $2^{\circ} 24' 50''$  and long.  $55^{\circ}$ , the geographical position of the town of Santarem situated at its mouth. This river rises in the plains of the Parexis, so called from an Indian nation which inhabits them. From these elevated plains descend the two greatest rivers of South America, viz. the Paraguay, and the Madeira, the largest river that flows into the Amazons on the south. The Tapajos flows in a contrary direction from these mountains. Its westernmost branch is the river Arinos, which entwines its sources with those of the Cuiaba at a short distance from those of the Paraguay. The largest and westernmost branch of the Tapajos is the Juruena, which rises in lat.  $14^{\circ} 20'$ , 20 leagues N.N.E. of Villa Bella, and running N. 120 leagues, flows into the Arinos, and with it forms the bed of the Tapajos. The Juruena may be navigated to its upper fall, within two leagues of its own source. From the geographical position of the Tapajos, it is evident that this river facilitates navigation and commerce from the maritime city of Peru to the mines of Matto Grosso and Cuiaba, by means of its large branches, the Juruena and Arinos. The Tapajos is known to be auriferous through a great part of its course.

TAPANANA, a name of the Hindoo regent of the sun. It means the *inflamer*. (See SURYA.) One of the five arrows with which the Hindoo Kama, or cupid, wounds his votaries, is named Tapanana. Its head is formed of a flower of a supposed inflaming quality.

TAPARICA, in *Geography*, an island at the entrance of All Saints' bay, on the coast of Brazil, about 25 miles long, and 5 broad. S. lat.  $13^{\circ}$ .

TAPAS, the name of a species of devotion, to which great merit and efficacy are ascribed by the Hindoos. It consists of intense contemplation, accompanied by austerities. See JAP.

The performance of the Tapas, or, more correctly written, Tapafya, is strongly recommended in Hindoo books; and numerous instances are there given of benefits conferred on the suppliants by the gods so propitiated. An individual, while in the performance of the penances of Tapafya, is called

called Tapaswi: he is much revered, and his prayers are earnestly solicited by the superstitious as necessarily efficacious. (See RAVENA.) Among his austerities he went through the following series, each of the eleven specific mortifications enduring one hundred years.

1. He stood on one foot, holding the other and both hands up toward heaven, with his eyes fixed on the sun.
2. He stood on one great toe.
3. He took as sustenance nothing but water.
4. He lived similarly on air.
5. He remained in the water.
6. He was buried in the earth, but continued, as in the other inflexions, in incessant adoration.
7. The same in fire.
8. He stood on his head, with his feet upwards.
9. He stood on one hand.
10. He hung by his hands on a tree.
11. He hung on a tree with his head downwards.

Some of the Puranas, or books of divine authority, contain a series of eighteen specific mortifications. One is now lying before us, and we give their denominations, with some explanatory observations.

1. *T'bedesfir*, is an elevation of the head, as the word denotes, during life: in this penance some devotees profess never to sit.
2. *Akas-muni*: this means ethereal contemplation: the aspirant in this case looks constantly on the heavens.
3. *Med'ha-muni*, indicates self-examination: the arms are usually crossed over the breast, and the penitent preserves a thoughtful posture or gait, with downcast looks.
4. *Pherfababu*, with arms projected horizontally.
5. *Dhamr-pana*, inversion; by suspension on a tree, &c. head downwards, over a fire.
6. *Patala-muni*: this is the reverse of *Akas-muni*, meaning subterrene contemplation; Patala being the name of the lower regions, and Yama the lord thereof. The Patala-muni constantly looks downwards to the earth.
7. *Muni*, preserving continued silence in aid of abstraction. The word means a wise man, a sage, or faint, as well as wisdom and contemplation. We know of no difference between this species of devotion and that called *Jap*, which see.
8. *Chourasi-afin*: the meaning of this compound word is eighty-four sitting positions; but it may have some other more mysterious and less obvious meaning. It would seem to be the reverse of some other penances, the merit of which consist in preserving one posture; whereas this implies an incessant variation to the extent of eighty-four changes.
9. *Kassali*: the Areka or betle-nut penance. This consists in standing soles upwards, the head resting on the nut placed on the ground. This is done at stated times; but cannot, one would think, be long continued.
10. *Patali*, the earthly or subterrene penance. This is described to be a partial burying of the body up to the breast, head downwards, and of course under ground, with the feet in the air, as in the last. One can scarcely see at first how this can be done; but probably the earth is placed very loosely about the head, &c. with the body or legs supported against a tree or wall.
11. *Urd'ha-babu*, with elevated hands, keeping them above the head. This is a common penance, persevered in sometimes till the arms become mere skin and bone, the fore-arms fixed immovably, crossing horizontally, and the finger-nails perhaps perforating the palms. A most eminent Urdha-babu is described, with a portrait, in the fifth volume of the Asiatic Researches, art. ii.
12. *Bait'siri*, sitting posture, never rising or lying.
13. *Nyas-d'hean*, retaining the breath. To this practice great merit is ascribed, and it is persevered in to a very extraordinary extent; till at length no respiration is visible. In this state impostors pretend to beatific visions, and the credulous of course admire the wonders they relate.
14. *Chourangi-afin*, a quadrupedal position, obtained by resting on the elbows and knees, putting the hands backwards over the shoulders, and keeping

hold of the toes. This must be a very awkward and uneasy posture, and not obtainable without much practice.

15. *Brabh-bansa*: this is a stage of austerities much venerated, and easily practicable, at least ostensibly. The devotee professes total indifference to every thing sublunary: he provides or asks for no food or clothing; he wanders or sits naked: if any one bring him food, he eats: his whole time, in short, is occupied in divine contemplation.
16. *Panch-agni*, five fires. The devotee sits on the ground, with a fire to the cardinal points, intense and near in proportion to his ability to bear them. The sun over head is the fifth fire. (See PANCH-AGNI.)
17. *Tirbanghi*, standing on one foot. This Lakshmi is related to have done for 100,000 years in the flower of the lotos, during one of her terrestrial incarnations, that she might be reunited to her lord Vishnu. (See PAVAKA.)
18. *Surya-varti*, propitiating Surya, or the sun. This is done in various ways. Sometimes by abstinence merely till he is risen, or until other prescribed ceremonies have been performed. Fixing the eyes constantly on the sun is another mode. See SURYA.

TAPASSANT, among *Hunters*, denotes *lurking*, or *squatting*. Hence also, *to tappy*, is to lie hid, as deer may do.

TAPA-TACSO, in *Geography*, a town of Thibet; 45 miles N.E. of Lassa.

TAPAUACA, a town of South America, in the province of Darien; 40 miles E.S.E. of St. Maria de Darien.

TAPAYAXIN, in *Zoology*, the name of a very remarkable species of lizard, called by Hernandez the *lacertus orbicularis*.

It is not of the long and slender shape of the common lizards, but as broad as it is long, and much resembling the ray-fish in shape, though seldom exceeding four inches in length or breadth. It is a cartilaginous lizard, of a very beautiful variety of colours, always very cold to the touch, and so sluggish a creature, that it often will not move out of its place even on touching it. Its head is exceedingly hard and elate, and has a sort of crown of prickles for its defence; yet it is a perfectly harmless animal, and so far from having the fear of man, and shyness that other beasts have, that it loves to be taken up and played with, and will stand perfectly still, and seem very happy while played with. Hernandez, lib. ix. cap. 16.

TAPE-WORM, a species of worm breeding in the human bowels, and called by authors *tania*, and *lumbricus latus*, or the broad worm. See TENIA.

The Greek and Roman physicians, as well as those of our own time, have described those sorts of worms to which the human bowels are subject. The common long worms, which resemble earth-worms; the ascarides, or small worms; and this tape-worm, which they have also called *vermis cucurbitinus*, or the gourd-worm, from its resembling, in some degree, the seeds of that fruit.

The interpreters of some of the Greek physicians have, however, been guilty of a great error, in confounding the gourd-worms and the ascarides together, though nothing can be more unlike. The ancients seem to have had a very just opinion of this animal in calling it *vermis cucurbitinus*, since it is plain by this, that they understood every joint, as we call them, of this creature, to be a distinct worm; and what we call a single worm, to be a long series of these worms, joined together end to end.

The true history of this animal is, that it is short and broad. What is called a link of the long worm is really a distinct worm; and when one of these multiplies in the bowels, its young adhere to it, and to each other endwise, so as to form a sort of chain, which lengthens as they con-

tinue

time to increase, and in fine becomes immoderately long. Hence it is that the breaking, as it is called, of this worm, does not destroy it, and that the voiding large pieces of it is no cure, since it still recovers that length again by new young ones. Every separate link of such a chain, if examined, is found to be entire, lively, and brisk, and not at all injured by the separation.

Dr. Tyfon, in the Phil. Transf. N<sup>o</sup> 146, gives a curious account of this worm: it is always single; it lies variously convoluted, being sometimes as long as all the guts, and sometimes it very much exceeds that length. Olaus Borrichius assures us, that a patient of his, in a year's time, voided eight hundred feet in measure of this worm, though in that length he did not meet with the head; in voiding, the patient always observed it to break off.

Dr. Tyfon parallels this case with that of a patient of his, who discharged vast quantities of this worm for several years, but in various pieces, of two, three, four, six, or more yards long, but all put together, would (he says) much exceed the length of that of Borrichius.

The joints in this worm are very numerous. In one of twenty-four feet long, Dr. Tyfon numbered five hundred and seven joints. Above the middle of the edges of each joint, he observed a protuberant orifice. Those orifices he takes for so many mouths; the best microscopes discovering no mouth in that part which usually passes for the head. This worm is common in most kinds of animals, as dogs, oxen, crabs, herrings, pikes, &c.

Some authors have asserted, that it is not one, but many worms linked together, and included in a spodium of the intestines; and that this spodium is not animated, but receives its sense and motion from a sort of vermiculi eucurbitini enclosed in it. This Gabucinus, de Lumb. Com. says, he has plainly discovered; but Dr. Tyfon abundantly evinces the contrary.

Authors who have treated of these worms as a disease, have given a canine appetite, or unnatural appetite to food, as one of the symptoms; but this is wrong, for it has never been found, in reality, that these worms, even where most numerous, have at all increased the natural appetite; and indeed it is very difficult to judge of their being in the body by symptoms, since they occasion none which are not also common in many other diseases. Many people have had them a long course of time, without being sensibly hurt by them; and there has never been known an instance of their occasioning any one's death, or indeed any considerable disorder.

Fern-root has been long known as a remedy against worms. See *Diseases of INFANTS*, and *WORMS*.

However, it was sunk into neglect till a few years ago, when it again came into notice, by being discovered to be the remedy which had become greatly celebrated in Switzerland as a specific in the cure of the *taenia* or tape-worm. The secret was purchased by the king of France, after its efficacy had been attested upon trial by some of the principal physicians at Paris.

The following has been published as the mode of its exhibition. After the patient has been prepared by an emollient clyster, and a supper of panada with butter and salt, he is directed to take in bed in the morning a dose of two or three drachms of the powder of male fern-root. The dose to infants is only one drachm. The powder must be washed down with a draught of water, but nothing else must be taken till two hours after, when a bolus of calomel, joined with some of the strongest cathartics, is to be given. If this does not operate, it must be followed by a dose of purging salts. By this method the worm is

commonly expelled in a few hours. If the trial does not succeed, the process must be repeated at due intervals. Lewis's Mat. Med. by Aikin, 1784.

TAPEANDURIAN, in *Geography*, a town on the E. coast of the island of Borneo. N. lat. 1° 24'. E. long. 117° 54'.

TAPEANTAN, a small island in the Sooloo Archipelago. N. lat. 6° 15'. E. long. 122° 9'.

TAPECON, in *Ichthyology*, a name given by some to the fish generally called the *uranoscopus*, or star-gazer.

TAPEINIA, in *Botany*, a little plant of the straits of Magellan, so named by Comnerfon, from *ταπεινος*, *humble*, or *low*; Jusf. 59. This is the *Isia pumila* of Forster, Pl. Magell. 11. t. 2, referred by Vahl to WITSENIA. See that article.

TAPER, TAPERING, is understood of a piece of timber, or the like, when broad at one end, and gradually diminishing to the other; as is the case in pyramids, cones, &c.

To measure taper timber, &c. see *SLIDING-Rule*.

TAPER-Bored is applied to a piece of ordnance, when it is wider at the mouth than towards the breech.

TAPER also denotes a kind of tall wax-candle, placed in a candlestick, and burnt at funeral processions, and in other church solemnities.

Tapers are made of different sizes; in some places, as Italy, &c. they are cylindrical; but in most other countries, as England, France, &c. they are conical or taper; whence possibly the name; unless we rather choose to derive taper in the adjective sense from the substantive *taper*, in the Saxon *tapen* or *tapon*, *ceruus*, *wax-candle*.

Both kinds are pierced at bottom, for a pin in the candlestick to enter.

The use of lights in religious ceremonies is of a long standing; the ancients, we know, used flambeaux in their sacrifices, and particularly in the mysteries of Ceres; and they had tapers placed before the statues of their gods.

Some suppose that it was, in imitation of this heathen ceremony, that lights were first introduced into the Christian church; others take it, that the Christians borrowed the practice from the Jews; but recourse need not be had to the one or the other. Doubtless, as in the first ages of Christianity, they had their meetings in obscure subterraneous vaults, there was a necessity for tapers, &c.; and there was even occasion for them after they had the liberty of building churches, those being contrived in such a manner as only to receive very little light, that they might inspire the greater awe and respect by the obscurity.

This original of tapers in churches is the most natural; but it is now a long time since the use of tapers, which necessity first introduced, is become a mere ceremony. St. Paulinus, who lived at the beginning of the fifth century, observes, that the Christians of his days were so fond of tapers, that they even painted them in their churches.

There are two ways of making tapers, the first with the ladle, the second by hand.

In the first, after the wicks (which are usually half cotton, half flax) have been well twisted, and cut of the due length, a dozen of them are hung, at equal distances, around an iron hoop, directly over a large copper basin full of melted wax.

Then taking an iron ladleful of the wax, they pour it gently over the wicks, a little below the tops of them, one after another; so that, the wax running down them, they become soaked and covered with it, and the surplus returns into the basin, under which is a pan of coals to keep it in fusion.

Thus they continue to cast on more and more wax for ten  
or

or twelve times, till the tapers be brought to the required dimensions. The first cast only soaks the wick, the second begins to cover it, and the rest give it the form and thickness; in order to which, they take care that every cast, after the fourth, be made lower and lower below the wicks to make them taper. The tapers, thus formed, are laid, while yet hot, one against another, in a feather-bed, folded double, to preserve them soft; and afterwards taken out thence, one after another, to be rolled on a long smooth table, with an oblong instrument of box, polished at the bottom, and furnished with a handle above.

The taper thus rolled and polished, a piece of its larger end is cut off, and a conical hole bored in it, with a boxen instrument, into which the pin or point of the candlestick is to be received.

While the broach is yet in the hole, they use to stamp the maker's name and the weight of the taper, with a boxen ruler, on which proper characters are cut. The taper is then hung up to harden, after which it is fit for use.

*Making of Tapers by Hand.*—The wicks being disposed, as in the former manner, they begin to soften the wax, by working it in hot water, in a narrow, deep, copper vessel. They then take a quantity of this wax out with the hand, and apply it gradually on the wick, which is fastened to a hook in the wall, at the end opposite to the collet; so that they begin to form the taper by the large end, and proceed, still lessening the thickness to the neck or collet.

The rest is performed after the same manner as in tapers made with the ladle, except that they do not lay them in the feather-bed, but roll them on the table as fast as they are formed.

Two things there are to be observed in the two kinds of tapers; the first, that, in the whole process of tapers with the ladle, they use water to moisten the table, and other instruments used therein, that the wax may not flick; and that, in the other, they use oil of olives, or lard, for the same end.

*TAPER, Paschal*, among the *Romanists*, is a large taper, on which the deacon applies five bits of frankincense, in holes made for the purpose, in form of a cross; and which he lights with new fire in the ceremony of Easter-Saturday.

The Pontifical makes pope Zosimus the author of this usage; but Baronius will have it more ancient; and quotes a hymn of Prudentius to prove it. That pope he supposes to have only established the use of it in parish-churches, which till then had been restrained to greater churches.

F. Papebroch explains the original of the paschal taper more distinctly in his "Conatus Chronico-Historicus," &c. It seems that, though the council of Nice regulated the day on which Easter was to be celebrated, the patriarch of Alexandria was enjoined to make a yearly canon of it, and to send it to the pope. As all the other moveable feasts were to be regulated by that of Easter, a catalogue of them was made every year; and this was written on a taper, *cereus*, which was blessed in the church with much solemnity.

This taper, according to the abbot Chastelain, was not a wax-candle made to be burnt; it had no wick, nor was it any thing more than a kind of column of wax, made on purpose to write the list of moveable feasts on; and which would suffice to hold that list for the space of a year.

For, among the ancients, when any thing was to be written to last for ever, they engraved it on marble or steel; when it was to last a long while, they wrote it on Egyptian paper; and when it was only to last a short time, they contented themselves to write it on wax. In process of time,

they came to write the moveable feasts on paper, but they still fastened it to the paschal taper; which practice was observed for a long time at Notre Dame, in Rouen, and throughout the order of Cluny. Such is the original of the benediction of the paschal taper.

*TAPERA*, in *Ornithology*, a species of swallow. See *HIRUNDO*.

*TAPERA dos Bocas*, in *Geography*, a town of Brasil, in the government of Para, on the Guanapu; 90 miles S.W. of Para.

*TAPERI*, a town of Peru; 16 miles N.E. of Cocha.

*TAPESTRY*, or *TAPISTRY*, a curious kind of manufacture, serving to adorn a chamber, or other apartment, by hanging or lining the walls of it.

Some use tapestry as a general name for all kinds of hanging, whether woven or wrought with the needle; and whether silken, woollen, linen, leathern, or of paper, (in which they are countenanced by the etymology of the word, formed from the French *tapiffer*, to line; of the Latin *tapes*, a cover of a wall or bed, &c.) But, in the common use of our language, the term is now appropriated to a kind of woven hangings of wool and silk, frequently raised and enriched with gold and silver, representing figures of men, animals, landscapes, &c.

The invention of tapestry seems to have come from the Levant; and what makes this the more probable is, that formerly, the workmen concerned in it were called, at least in France, *Sarazins*, or *Sarazinois*.

Some have supposed that the English and Flemish, who were the first that excelled in it, might bring the art with them from some of the croisades or expeditions against the Saracens. Accordingly they say, that those two nations were the first who set on foot this noble and rich manufacture in Europe, which afterwards became one of the finest ornaments of palaces and churches, &c. At least, if they be not allowed the inventors, they have the honour of being the restorers, of this curious and admirable art, which gives a kind of life to wools and silks, in some respects not inferior to the paintings of the best masters. However, it does not appear at what precise era this manufacture was introduced into Europe; nor is it certain to whom it was owing.

Guicciardin, in his "Description and History of the Netherlands," printed at Antwerp in 1582, ascribes the invention of the art of making tapestry hangings to the Netherlanders, but he does not assign the time of the invention.

The art of weaving tapestry was brought to England by William Sheldon, esq. about the end of the reign of Henry VIII. See Dugdale's Warwickshire in Stemmat Sheldon, p. 584.

In the reign of king James, the manufacture of tapestry was set up at Mortlake, in Surrey. Aubrey, indeed, in his history of that county, dates its institution in the subsequent reign; but Lloyd (State Worthies, p. 953.) is not only positive for the former era, but affirms, that at the motion of king James himself, who gave two thousand pounds towards the undertaking, sir Francis Crane erected the house at Mortlake for the execution of the design; and this is confirmed by authentic evidence; for, in Rymer's Fœdera, vol. xviii. p. 66, there is an acknowledgment from king Charles in the first year of his reign, viz. 1625, that he owes six thousand pounds to sir Francis Crane for tapestry; and he grants to him two thousand pounds yearly, for ten years, towards the maintenance of the said work.

These works at Mortlake, which at first had been conducted after old patterns, were afterwards formed from designs,

## TAPESTRY.

designs, both in history and grotesque, furnished by Francis Cleyn, and thus carried to singular perfection.

From the *déc* above recited, it is plain that the manufacture was then arrived at great perfection. See Mr. Walpole's *Anecdotes of Painting in England*, vol. ii. p. 36.

In the year 1663, a statute was enacted (cap. 15.) for the encouragement of the linen and tapestry manufactures of England, and discouragement of the very great importation of foreign linen and tapestry.

The first establishment of a tapestry manufacture at Paris was under Henry IV., in the year 1606 or 1607, by means of several excellent artists, whom he invited from Flanders.

But this fell with the death of that prince. Under Lewis XIV. the manufacture was retrieved by the care and address of the great M. Colbert, to whom is owing the establishment of the Gobelins, a royal tapestry manufactory, which has produced works of this kind scarcely inferior to the finest English or Flemish tapestry, either with regard to the design, the colours, or the strength.

In this manufactory both wool and silk are used, and sometimes gold and silver. The finest paintings may be copied in this work, and the greatest masters have been employed in draughts for the tapestry weavers.

The weavers of the Gobelins work behind, or on the wrong side of the loom, which stands upright, and the pattern is placed on either side of the workman.

As the tapestry of the Gobelins is made of pieces of a certain breadth only, there are other workmen, called *ren-trayeurs*, or *fine-drawers*, who are employed in sewing or fine-drawing the several parts together, so that no seam is discernible, but the whole appears as one design, like a piece of silk from a loom. These workmen are also useful in mending and cleaning tapestry when damaged or sullied.

The tapestry-men distinguish two kinds of work; *viz.* tapestry of the *high* and the *low warp*, though the difference is rather in the manner of working, than in the work itself, which is, in effect, the same in both, only the looms, and consequently the warps, are differently situated; those of the *low warp* being placed flat, and parallel to the horizon, and those, on the contrary, of the *high warp*, erected perpendicularly.

The French have had three considerable tapestry manufactories besides that of the Gobelins; the first at Aubusson, in Auvergne; the second at Felletin, in the Upper Marche; and the third at Beauvois: they were all equally established for the high and the low warp; but all laid aside the former, excepting that of the Gobelins.

There are admirable low warps in Flanders, generally exceeding those of France; the chief and almost only Flemish manufactories were at Brussels, Antwerp, Oudenard, Lille, Tournay, Bruges, and Valenciennes.

At Brussels and Antwerp they succeeded both in human figures and animals, and in landscapes; and that both with respect to the designing and the workmanship. At Oudenard their landscapes and animals were good, but their human figures not well executed. Lille, and the other cities named, came behind Oudenard. The French manufactory of Felletin has done tolerably well in landscapes, Aubusson in figures, and Beauvois in both.

The usual widths of tapestries were from two ells to three ells and a half, Paris measure.

The manufacture of tapestry of each kind (though less fashionable and in use than formerly) is too curious to be here pass over without a short description. We shall give each under its separate article.

*Manufacture of Tapestry of the High Warp.*—The loom

on which this is wrought is placed perpendicularly; it consists of four principal pieces; two long planks or cheeks of wood, and two thick rollers or beams. The planks are set upright, and the beams across, one at top, and the other at bottom, a foot distance from the ground. They have each their trunnions, by which they are suspended on the planks, and are turned with bars. In each roller is a groove, from one end to the other, capable of containing a long round piece of wood, fastened in it with hooks. Its use is to tie the ends of the warp to. The warp, which is a kind of worsted, or twisted woollen thread, is wound on the upper roller; and the work, as fast as woven, is wound on the lower.

Withinside the planks, which are seven or eight feet high, fourteen or fifteen inches broad, and three or four thick, are holes pierced from top to bottom, in which are put thick pieces of iron, with hooks at one end, serving to sustain the coat-stave: the pieces of iron have also holes pierced in them, by putting a pin in which, the stave is drawn nearer, or set farther off; and thus the coats or threads are stretched and loosened at pleasure. The coat-stave is about three inches diameter, and runs all the length of the loom; on this are fixed the coats, or threads, which make the threads of the warp cross each other. It has much the same effect here as the spring-stave and treddles have in the common looms. The coats are little threads fastened to each thread of the warp, with a kind of sliding-knot, which forms a sort of mesh or ring. They serve to keep the warp open, for the passages of broaches wound with silks, woollens, or other matters used in the piece of tapestry.

Lastly, there is a number of little sticks, of different lengths, but all about an inch diameter, which the workman keeps by him in baskets, to serve to make the threads of the warp cross each other, by passing them across: and that the threads thus crossed may retain their proper situation, a packthread is run among the threads above the stick.

The loom thus formed, and mounted with its warp, the first thing the workman does, is to draw, on the threads of this warp, the principal lines and strokes of the design to be represented on the piece of tapestry; which is done by applying cartoons made from the painting he intends to copy, to the side that is to be the wrong side of the piece; and then with a black-lead pencil following and tracing out the contours of them on the thread of the right side; so that the strokes appear equally both before and behind. As to the original design the work is to be finished by, it is hung up behind the workman, and wound on a long staff, from which a piece is unrolled, from time to time, as the workman proceeds.

Besides the loom, &c. here described, there are three other principal instruments required for working the silk, or wool of the woof within the threads of the warp. These are a broach, a reed, and an iron needle.

The broach is of hard wood, seven or eight inches long, and two-thirds of an inch thick, ending in a point, with a little handle. It serves as a shuttle, the silks, woollens, gold, or silver, to be used in the work, being wound on it. The reed, or comb, is also of wood, eight or nine inches long, and an inch thick at the back; whence it usually grows less and less, to the extremity of the teeth, which are more or less apart, according to the greater or less degree of fineness of the intended work.

Lastly, the needle is in form of a common needle, only bigger and longer. Its use is to press close the wool and silks, when there is any line or colour that does not fit well.

All things being prepared for the work, and the work-

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man ready to begin, he places himself on the wrong side of the piece, with his back towards the design; so that he works, as it were, blindfold, seeing nothing of what he does; and being obliged to quit his post, and go to the other side of the loom, whenever he would view and examine the piece, to correct it with his pressing-needle.

To put any silk, &c. in the warp, he first turns and looks at his design; then taking a broach full of the proper colour, he places it among the threads of the warp, which he brings across each other with his fingers, by means of the coats or threads fastened to the staff: this he repeats every time he is to change his colour.

The silk, or wool, being placed, he beats it with his reed, or comb; and when he has thus wrought in several rows over each other, he goes to see the effect they have, in order to reform the contours with his needle, if there be occasion.

As the work advances, they roll it up on the lower beam, and unroll as much warp, from the upper beam, as suffices them to continue the piece: the like they do of the design behind them. When the pieces are wide, several workmen may be employed at once.

We have but two things to add: the first, that this high-warp tapestry goes on much more slowly than the low-warp, and takes almost double the time and trouble. The second, that all the difference the eye can observe between the two kinds consists in this, that in the low warp there is a red fillet, about one-twelfth of an inch broad, running on each side from top to bottom; which is wanting in the high warp.

*Manufacture of Tapestry of the Low Warp.*—The loom, or frame, on which the low warp is wrought, is much like that of the weaver's: the principal parts of it are two strong pieces of wood forming the sides of the loom, and bearing a beam, or roller, at each end: they are sustained at bottom with other strong pieces of wood, in manner of trestles; and to keep them the firmer, they are likewise fastened to the floor with a kind of buttresses, which prevent any shaking, though there are sometimes four or five workmen leaning on the fore-beam at once.

The rollers have each their trunnions, by which they are sustained: they are turned by large iron pins three feet long. Along each beam runs a groove, in which is placed a *wich*, a piece of wood of about two inches diameter, and almost of the length of the roller: this piece fills the groove entirely, and is fastened in it, from space to space, by wooden pins. To the two wiches are fastened the two extremities of the warp, which is wound on the farther roller; and the work, as it advances, on the nearer.

Across the two sides, almost in the middle of the loom, passes a wooden bar, which sustains little pieces of wood, not unlike the beam of a balance: to these pieces are fastened strings, which bear certain spring-staves, with which the workman, by means of two treddles, under the loom on which he sets his feet, gives a motion to the coats, and makes the threads of the warp rise and fall alternately. Each loom has more or fewer of these spring-staves, and each staff more or fewer coats, as the tapestry consists of more or fewer threads.

The design or painting, the tapestry-man is to follow, is placed underneath the warp; where it is sustained from space to space with strings, by means of which the design is brought nearer the warp.

The loom being mounted, there are two instruments used in working of it: *viz.* the reed, and the flute. The flute does the office of the weaver's shuttle; it is made of an hard polished wood, three or four lines thick at the ends, and

somewhat more in the middle, and three or four inches long. On it are wound the silks, or other matters, to be used as the woof of the tapestry. The comb or reed is of wood or ivory; it has usually teeth on both sides; it is about an inch thick in the middle, but diminishes each way to the extremity of the teeth: it serves to beat the threads of the woof close to each other, as fast as the workman has passed and placed them with his flute among the threads of the warp.

The workman is seated on a bench before the loom, with his breast against the beam, only a cushion or pillow between them; and, in this posture, separating, with his fingers, the threads of the warp, that he may see the design underneath, and taking a flute, mounted with a proper colour, he passes it among the threads, after having raised or lowered them, by means of the treddles moving the spring-staves and coats.

Lastly, To press and close the threads of the silk or yarn, &c. thus placed, he strikes each course (*i. e.* what the flute leaves in its passing and coming back again) with the reed.

What is very remarkable in the manufacture of the low warp, is, that it is all wrought on the wrong side; so that the workman cannot see the right side of his tapestry, till the piece be finished and taken out of the loom.

M. Le Blon, in endeavouring to fix the true harmony of colouring in painting, found that all visible objects may be represented by the three primitive colours, red, yellow, and blue; because out of these, all others, even black itself, may be compounded.

From the principle of producing any visible object with a small number of colours, and from observing the compounded colours which were reflected from two pieces of silk of different colours, placed near to one another, he arrived at the skill of producing in the loom all that the art of painting requires. In weaving, indeed, he hath been obliged to make use of white and black threads, besides red, yellow, and blue; and though he found that he was able to imitate any picture with these five colours, yet for cheapness and expedition, and to add a brightness where it was required, he found it more convenient to make use of several intermediate degrees of colours.

In his new way of weaving tapestry in the loom with a draw-boy, it may be performed almost as expeditiously as fine brocades; for when the loom is once set and mounted, any common draught-weaver, unacquainted with drawing or painting, and indeed hardly knowing what figure he is about, may exactly produce what the painter hath represented in the original pattern: and thus a piece of tapestry may be woven in a month or two, which, in the common way of working, would take up several years; and what in the common way costs a thousand pounds, may, by this means, be afforded finer and better for a hundred.

The main secret of this consists in drawing the patterns, from which any common draught-weaver can mount the loom; and when that is done, the piece may be made of any size, by only widening the reeds and the warp; and a reverse may be made with the same ease; which is done by the boy's pulling the lashes up again in the same order in which he pulled them down before: by which contrivance the tapestry may be suited to any room, whether the light comes in on the right, or on the left. The patterns are painted upon paper, on which are printed squares from copper-plates, and these subdivided by as many lines as answer to the threads of the warp, which run lengthwise of the piece; then they try how many threads of the shoot answer in breadth to every subdivision of the squares. Every thread

of the warp goes through a small brass ring called a *male*, or through a loop in the leish, and hath a small long weight or lingoe hung below, to counterbalance the packthreads, which going from the top of the rings or loops, are passed over the pullies in the table directly over the loom, and are continued nearly in an horizontal position on one side of the loom to a convenient distance; where they are all spread on a cross piece fastened to two staples: these are called the *tail of the mounture*; and from each of these packthreads, just by the side of the loom, are fastened other packthreads, called *simples*, which descend to the ground; so that by pulling these simple cords, you raise any of the threads of the warp at pleasure: wherefore they fasten a loop or potlart to as many of these simple cords as there are threads of the warp to be pulled up at every shoot, or every throw of the shuttle; by which means the shoot shews itself on the right side, where the warp is pulled up: and in ordering this, they are guided by the pattern, on which they count the distances of the subdivisions, which contain the same colours in the same line, and can be shot at once: then they fasten potlarts to the several simple cords that draw up the rings, through which those threads of the warp run, which are to lie behind this colour; they tie all these loops together, and fasten a piece of worsted or silk to the knot, of the same colour that the workman is to throw; and the boy, when he pulls each loop, names the colour, that the weaver may take the proper shuttle, and so on for every colour to be thrown. Phil. Trans. abr. vol. vi. p. 469, &c.

In connection with this subject, we are naturally led to give a brief account of the manufacture of carpets. This is said to have been introduced into France from Persia, in the reign of Henry IV., where it has been distinguished by extraordinary encouragement. The most considerable manufactory of this kind was that of Chaillot, or the royal manufactory of La Savoniere, or the Soap-house, about a league from Paris. This manufacture was altogether of wool, and worked in the manner of velvet. All sorts of figures of animals may be imitated in this work, but fruits and flowers answer best; and it is most successfully applied to the manufacture of carpets and all sorts of screens.

The carpets are, in some respect, wrought by the upright way of tapestry. The two rollers are placed the same way: the warp is braced from the top downward; the chain, with its loops, keeps all the threads of the warp equally perpendicular; the stick, which facilitates their crossing, runs through them in the same manner, and separates the foremost threads from the rest; the lizier-pole holds all the strings, which serve to draw the fore-threads in their turns, and then the opposite threads, in order to insert the spindles of wool. But the method of working in this manufactory differs from the upright way of tapestry in the following particulars.

The warp is divided, both before and behind, into parcels of ten threads, nine white and one blue; which is regularly continued through the whole width of the piece. The weaver works on the fore-side, and consequently sees what he does. The design or pattern is traced in its proper colours on cartons, tied about the workman, who looks at it every moment, because every stitch is marked upon it, as it ought to be in his work. By this means he always knows what colours and shades he is to use, and how many stitches of the same colour. In this he is assisted by squares, into which the whole design is divided; each square is subdivided into ten vertical lines, corresponding with each parcel of ten threads of the warp; and besides, each square is ruled with ten horizontal lines, crossing the vertical lines at right angles. The workman having placed his spindles of thread near him,

begins to work on the first horizontal line of one of the squares. These lines marked on the carton are not traced on the warp, for this would be endless; because an iron-wire, which is longer than the width of a parcel of ten threads, supplies the place of a cross line. This wire is managed by a crook at one end, at the workman's right hand; towards the other end it is flatted into a sort of knife, with a back and edge, and grows wider to the point. The workman fixes his iron wire, or rod, horizontally on the warp, by twisting some turns of a suitable thread of the woof round it, which he passes forward and backward, behind a fore-thread of the warp, and then behind the opposite thread, drawing them in their turn by their leishes. Afterwards, if it be necessary, he brings his woof-thread round the wire, in order to begin again to thrust it into the warp. He continues in this manner to cover the iron rod or wire, and to fill up a line to the tenth thread of the warp, which is the blue one. He is at liberty either to stop here, or go on with the same cross line in the next division. According as he passes the thread of the woof round the iron wire, and into the warp, the threads of which he causes to cross one another at every instant; when he comes to the end of the line, he takes care to strike in, or close again all the stitches with an iron reed, whose teeth freely enter between the empty threads of the warp, and which is heavy enough to strike in the woof he has used. This row of stitches is again closed and levelled, by a dweet of blue thread doubled, which the workman puts into the warp, sliding his hand over the whole length of line he has wrought. He crosses the same threads of the warp, and then stretches through them another single blue thread. He beats in these two threads, one after another, with his reed; these dweets of cross thread, which are a support to each line, will be hid by the pile on the fore-side, and they indeed diminish the beauty of the wrong side; but this is of no consequence. This done, the workman draws the iron rod or knife out of the loops of the woof that covered it; and as it is wider towards its end, these loops resist its passage; but being edged at its fore part, it cuts them through. Then the workman with his left hand lays a strong pair of shears along the finished line, cuts off the loose hairs, and thus forms a row of tufts perfectly even, which, together with those before and after it, form the shag. One line of this sort comprehending the row of stitches and woollen pile, with the two blue threads which support them, somewhat surpasses in thickness the space between the first and second cross line of a square. By this means the workman always sees what he is doing. He follows, stitch for stitch and colour for colour, the plan of his pattern which he is at, and paints magnificently, without having the least notion of painting or drawing.

The manufacture of carpets, after the manner of Chaillot, was introduced into London in the year 1750, by two workmen who left the manufactory in disgust, and came here to procure employment. They were encouraged and furnished with materials by Mr. Moore, to whose assiduity and zeal the establishment of this sort of manufactory has been principally owing. However, these men afterwards connected themselves with a Mr. Peter Parisot, who, under the patronage, and by means of the pecuniary assistance of his royal highness the duke of Cumberland, pursued the manufacture of a carpet already begun at Paddington. This undertaking was soon removed to Fulham, and, under the munificence of the duke, promised to be durable and advantageous. In 1752, Parisot, the undertaker, proposed a plan of subscription, the nature of which it is now needless to recite; as the whole scheme, as far as he was concerned in it, soon came to nothing. But Mr. Moore, being provided

vided with the necessary materials, and engaging proper workmen, and risking a very considerable expence, succeeded in establishing this important and useful manufacture, inasmuch that, in 1757, he obtained a premium from the Society of Arts, &c. for the best carpet in imitation of the Turkey carpets; and by his ingenuity and perseverance in bringing this manufacture to perfection, it is now arrived at a very high degree of reputation.

Mr. Whitby and Mr. Paffavant were also honoured with premiums for carpets of their manufacture by the Society of Arts in 1757 and 1758. We have also manufactories for carpets that are much esteemed at Axminster and Wilton; not to mention those of Kidderminster and other places.

**TAPETI**, in *Zoology*, the name of an animal common in the West Indies, and called by some *cuniculus Americanus*, the American rabbit. In the Linnæan system, this animal is a species of hare, or *lepus Brasiliensis*. (See **LEPUS**.) It has large ears like the common hare; a white ring round the neck, though some have not this ring; the face of a reddish colour; the chin white, the eyes black; colour of the body like that of the common hare, but darker; the body whitish, without a tail. These animals inhabit Brasil, live in woods, do not burrow, are very prolific, and afford good meat. The tapeti is found also in Mexico, where it is called *cili*. Pennant.

**TAPHICESIUS LAPIS**, a name given by Pliny and the ancients to a species of ætites, or eagle-stone, found in a place of that name near Leucadia.

**TAPHNEUS**, a word used by some writers to express any thing when depurated or purified to the greatest degree, as the salts, by repeated solutions and crystallizations, and the like. Paracelsus uses it for a species of earth, the things produced from which, he says, never alter their nature by calcination or reverberation, or the like operations.

**TAPHNIS**, in *Ancient Geography*, a town of Egypt, mentioned by the prophet Jeremiah, to which he and the Israelites that were with him retired.

**TAPHRA**, a town situated in the isthmus of the Tauric Chersonesus, mentioned by Pliny and Strabo.

**TAPHROS**, a name which was given to the strait that separates the island of Sardinia from that of Corsica.

**TAPHRURA**, or **TAPHRA**, a town of Africa Propria, upon the gulf of Numidia.

**TAPHUA**, a town of Palestine, in the tribe of Juda. — Also, a town of Palestine, which belonged to the tribe of Ephraim, and was situated upon the frontier of that of Manasseh.

**TAPIA**, in *Botany*, an American name, adopted by Plumier from Pifo. See **CRATEVA**.

**TAPIA**, in *Geography*, a town of South America, in the kingdom of New Granada, and province of St. Martha.

**TAPIAN POINT**, a cape on the W. coast of Mindanao. N. lat. 7°. E. long. 124° 30'.

**TAPIAU**, a town of Prussia, in Samland, on the Pregel; 20 miles E.S.E. of Königsberg. N. lat. 54° 36'. E. long. 21° 13'.

**TAPICURU**, a river of Brasil, which runs into the sea, S. lat. 12° 20'.

**TAPI-HOTUN**, a town of Corea; 690 miles E. of Peking. N. lat. 40° 20'. E. long. 125° 22'.

**TAPINOSIS**, *ταπεινωση*, in *Rhetoric*, the same with *diminution*; which see.

**TAPION, LE**, in *Geography*, a town on the W. coast of Hispaniola; 10 miles E. of St. Marc.

**TAPIR**, or **TAPIJERETE** of Marcgrave, in *Zoology*, the name of an animal found in some parts of America, and

called by the Portuguese *anta*, by others *danta*, by Dampier *vache montagnarde*, and by others *elan*, and *fus aquaticus*, and in the tenth edition of the Linnæan System, *hippopotamus terrestris*. Gmelin makes it a distinct genus; and his generic characters, amended by Dr. Shaw, are as follow; *front teeth* in both jaws ten; *canine teeth* in both jaws single, incurvated; *grinders* in both jaws five on each side, very broad; *feet* with three hoofs, and a false hoof on the fore-feet.

This animal (*Tapir Americanus*) is of the size of a young calf, or heifer, and in shape somewhat approaching to the figure of the hog, and the back arched; its head is thicker than a hog's, and ends in a sharp ridge at top; and the male has a snout, or sort of proboscis, hanging over the opening of the mouth, in which he has a very strong muscle, serving to retract it at pleasure; the nose of the female is destitute of the proboscis, (this circumstance is doubted by Sonnini,) and the jaws are of equal length; its eyes are small, and very like those of the hog; its ears roundish, bordered with white; and these he can draw forward at pleasure; its legs are thick, and not longer than those of our hogs; its fore-hoofs are divided into three portions; and a sort of false hoof behind; but its hind-hoofs into three; its tail is very small; the skin is hard and solid; and the hair short, and of a pale brown, and when young, variegated with white spots; and along the neck is a brittle mane, an inch and a half high. It lives in thick woods, on the eastern side of South America, from the isthmus of Darien to the river of the Amazons; and sleeps all day, but at night, or early in the morning, goes out for its prey: it feeds on vegetables, and is particularly fond of the stalks of the sugar-cane; it often takes the water, and swims excellently: the natives, in places where it is common, eat its flesh, which is said to be good: the Indians shoot it with poisoned arrows, and cut the skin into bucklers. This animal is falacious, slow-footed, and sluggish, and makes a kind of hissing noise; but perfectly harmless: the young are easily tamed, and may be rendered domestic, which is said to be the case in some parts of Guiana. When attacked by dogs, it makes a vigorous resistance. The tapir produces but one young at a birth, of which it is very careful, leading it at an early age to the sea, and instructing it to swim. Ray and Pennant.

**TAPIRIA**, in *Botany*, Juss. 372, slightly altered from the still more barbarous *Tapirira*, Aubl. Guian. 470. t. 188, which is itself an alteration of the Caribbean name *Tapiriri*, by which this tree is known in Guiana. See **JONQUETIA**.

**TAPIR-TALA**, in *Geography*, a town of Chinese Tartary. N. lat. 43° 15'. E. long. 120° 39'.

**TAPIS**. See **TUNICA**.

**TAPL**, in *Geography*. See **TOPEL**.

**TAPLAKEN**, a town of Prussia, in Samland, on the Pregel; 24 miles E. of Königsberg.

**TAPLEYS**, a town of North Carolina; 12 miles N.E. of Hillsborough.

**TAPLINGS**, in the *English Salt-Works*, the name given to certain bars of iron which support the bottom of the pan in which the brine is boiled.

These pans are very large, and cover a wide furnace; but as their width would make them apt to bend in the middle, which would spoil the working of the salt, there is a sort of wall of brick carried along the middle of the furnace, and on the top of this are placed these taplings: they are about eight inches high, and from four to six in thickness, being smallest at the top. These are placed at about three feet distance one from another, and the wall which supports them, and which is called the *mid-feather*, is broad at the base, and so narrow at the top, as barely to give room for the bases of the taplings.

**TAPOAMANAO**, in *Geography*. See *Sir Charles SANDERS's Island*.

**TAPONA**, a river of Brasil, which runs into the sea, S. lat.  $21^{\circ} 10'$ .

**TAPOCOROI**, a river of Brasil, which runs into the sea, S. lat.  $27^{\circ}$ .

**TAPOGOMEA**, in *Botany*, from the Caribbean name of one of the species, *Tapogomo*; Aubl. Guian. 157. Juss. 208. See **CALLICOCCA**.

**TAPOOKAS**, in *Geography*, a town of the state of Georgia, on the Yazoo. N. lat.  $35^{\circ} 57'$ . W. long.  $89^{\circ} 51'$ .

**TAPPOOL**, a small island in the Sooloo Archipelago. N. lat.  $5^{\circ} 37'$ . E. long.  $120^{\circ} 52'$ .

**TAPPOOR**, a town of Hindoostan, in the Mysore; 15 miles S.S.W. of Durampoory.—Also, a river of Hindoostan, which runs into the Cauvery, 4 miles N. of Cavripatam.

**TAPOSIRIS**, in *Ancient Geography*, a town of Egypt, at some distance from the sea, between Cynossena and Pimthyna.—Also, another town, called *Parva Taposiris*, on a tongue of land between the sea and the canal which passed from Canopus to Alexandria.

**TAPPA**, in *Geography*, one of the small Molucca islands; separated by a narrow channel from Latalatta: on it is a pool of fresh water; a little to the north of the line. E. long.  $127^{\circ} 5'$ .

**TAPPAHANOCK**, a town of the United States of America, in Virginia, on a small river, which runs into the Rappahanock; 43 miles N.E. of Richmond. N. lat.  $37^{\circ} 58'$ . W. long.  $76^{\circ} 55'$ .

**TAPPALANG**, a town on the west coast of the island of Celebes. S. lat.  $2^{\circ} 25'$ . E. long.  $119^{\circ} 5'$ .

**TAPPAN**. See **ORANGE-TOWNS**.

**TAPPANOOLY**, a sea-port town of the island of Sumatra, situated on the west coast, in the country of Batta, on a small island called Punchongcachecie. The bay is very deep, capable of containing the united navies of Europe, and consisting of a number of harbours within one another. The bay stretches into the heart of the Batta dominions, and its borders are inhabited by that people, who barter here the produce of their country for such articles as they want. The English East India company have a factory here. N. lat.  $1^{\circ} 45'$ . E. long.  $98^{\circ} 12'$ .

**TAPPI**, or **TALI**, called by the Moors *Chedler*, a river of Hindoostan, which, as They not says, has its source ten miles from the little town of Bempore, in the kingdom and mountains of Decan, and runs into the sea about  $2\frac{1}{2}$  leagues below Surat. The Banians and Gentoos esteem this a very holy river.

**TAPPING**, the act of piercing a hole in a vessel, and applying a tube, or cannula, in the aperture, for the commodious drawing off the liquors contained therein.

**TAPPING**, in *Agriculture*, is the making an incision in the bark of a tree, and letting out the juice.

To tap a tree at the root, is to open it round about the root.

Ratray, the learned Scot, affirms, that he has found by experiment, that the liquor, which may be drawn from the birch-tree in the spring-time, is equal to the whole weight of the tree, branches, roots, and all together.

In the tapping of trees, the juice, taken in from the earth, ascends from the root; and, after it is concocted and assimilated in the branches, &c. it descends, like a liquor in an alembic, to the orifice or incision where it issues out.

One of the most effectual ways of tapping, so as to obtain the greatest quantity of sap in the shortest time, is not only

to pierce the bark, or to cut the body of the tree almost to the pith, with a chisel (as some have directed), but to bore it quite through all the circles, on both sides of the pith, leaving only the outermost and the bark on the north-east side unpierced.

This hole is to be bored sloping upwards, as large as the largest auger will make; and that also through and under a large arm near the ground. So will it not need any stone to keep open the orifice, nor tap to direct the sap into the receiver.

By this method the tree will, in a short time, afford liquor enough for brewing; and with some of this sweet sap, one bushel of malt will make as good ale as four bushels of malt with ordinary water. The large maple, which we call the sycamore, is said to yield the best brewing sap, its juice being very sweet and wholesome. See **BETULA**.

*To preserve the Sap for Brewing*.—Infolate it by a constant exposure to the sun in proper vessels, till the rest be gathered and ready, otherwise it will contract an acidity: when there is enough, put into it as much very thin cut and hard-toasted rye-bread, as will serve to ferment it; and when it works, take out the bread, and bottle up the liquor. A few cloves in each vessel that receives the sap, as it oozes from the tree, will also, certainly, preserve it a twelvemonth. See Dr. Tonge's Obs. in the Philosophical Transactions, N<sup>o</sup> 43, 44, 46. 68. or Abr. vol. ii. p. 673, &c.

**TAPPING of Oaklings and other Trees**, the practice of cutting off the tap-roots of young oaks and other trees or plants of that kind.

It has been noticed by Mr. Nicol, in his work on planting, that those who are in favour of this method, rather than that of sowing the seeds of these sorts of trees, suppose that tapping the downward roots of the young plants while they are in the nursery plantation, has the power and capability of making their roots ever afterward have a horizontal tendency in the earth or soil; that in consequence of it they are not liable to injury by insinuating themselves downwards into bad soil; and that by a plentiful planting of nursing plants, to draw them upright, the necessity of heading them down is prevented. But that these are correct and solid arguments, he thinks, it is much to be questioned. No doubt, he supposes, exists that tapping is of infinite advantage to all tap-rooted plants of the tree kind, previous to their removal, since it causes them to put forth fibres on the upper part of the root, which they otherwise would not have done; sitting them thereby for being transplanted into shallow soils, and for seeking pasturage for the sustenance of the plants. But that the roots will, ever afterwards, have a horizontal tendency, may, it is believed, be fairly denied. Every plant, unless constrained, it is maintained, will follow its own natural inclinations and habits of growth. Nor can all the art of man prevent a downward tendency in the roots of these sorts of tree-plants, and at the same time allow them depth of soil. See **TAP-ROOT**.

**TAPPING of Springs**, the practice of boring through the surface covering materials of land with the auger, and letting off the hurtful water which is pent up, confined, and contained in the clayey bed or stratum below. See **SPRING-Drain**.

**TAPPING**, a term applied to an operation which is sometimes performed on sheep for removing a disease of the local dropsical kind in the head. It is executed either by means of a very large pin, or a trocar made for the purpose. See **STURDY**.

**TAPPING**, in *Mechanics*, a term applied to the making and rectifying of female screws by means of a tap, *i. e.* a screw prepared and reserved for this purpose. The process, which

confists of various manipulations, is minutely described in Nicholson's Journal, vol. i. p. 160—163. See SCREW.

TAPPING, in *Surgery*. See PARACENTESIS.

TAPPOOS, in *Geography*, a town on the W. coast of Sumatra; 25 miles N. of Tappanooly.

TAPROBANA, or TAPROBANE, in *Ancient Geography*, a name anciently given to the island of Ceylon; which see.

TAPSAGUN, a town in the interior of Africa, and one of those which were subjugated by Cornelius Balbus.

TAPSAS, a river of Africa, which ran near the town of Rusicada.

TAPSON, in *Geography*, a town of Thibet; 50 miles E. of Tchontori.

TAPSUS, or THAPSUS, in *Ancient Geography*, a peninsula on the eastern coast of Sicily, between Hybla parva and Syracuse.—Also, a promontory of Africa, 12 leagues E. of the promontory Tritum. This formed the eastern extremity of the Sinus Numidicus.

TAPTEE, in *Geography*, a river of Hindoostan, formed by the union of several smaller rivers in the Candish country, which runs into the gulf of Cambay, about 12 miles below Surat. See TAPPI.

TAP-TOO. See TAT-TOD.

TAPUI-TAPER, in *Geography*, a town of Brasil, on the coast; 15 miles N.W. of St. Luis de Marannon.

TAPURA, in *Botany*, an unexplained name of Aublet's. See ROHRJA.

TAPURA, in *Ancient Geography*, a town of Asia, in the mountains of Lesser Armenia.

TAPURI, or TAPYRI, a people of Asia, in Media.

TAPURI Montes, mountains of Scythia, on this side of mount Imaus. Ptolemy.

TAPUYAS, in *Geography*, a river of Brasil, which runs into the river of the Amazons; the banks of which are inhabited by Indians, independent of the Portuguese.

TAQUARI, a river of Brasil, having the largest of its many mouths in the Paraguay, in lat. 19° 15', and long. 54°.

TAR. See PAMLICO.

TAR, or *Tarr*, a thick dark-brown or black resinous adhesive juice, issuing from the wood and bark of old pines or firs, either naturally, or by burning. See PINUS.

Some modern writers inform us, that tar flows from the trunks of pines and firs, when they are very old, through incisions made in the bark near the root; that pitch is only tar inspissated; and both are the oil of the tree grown thick and black with age and the sun. The trees, like old men, being unable to perspire, and the secretory ducts obstructed, they are, as one may say, choked and stuffed with their own juice. But the method used by our colonies in America of making tar and pitch, is, in effect, the same with that of the ancient Macedonians; as appears from the account given in the Philosophical Transactions. And the relation of Leo Africanus, who describes, as an eye-witness, making of tar on mount Atlas, agrees in substance with the methods used by the Macedonians of old, and the people of New England of this day. The greater part of the tar imported into Britain is brought from the Baltic, and is still prepared in nearly the same method which is described by Dioscorides as having been practised by the ancients. The branches of the trees are cut into billets, and piled up in large stacks, which are covered with turf. Fire is then applied to the wood, and it is suffered to burn with a slow smothered flame, during which process the tar is formed by the decomposition of the resinous juice, which flows to the bottom, and runs out through a small channel cut for the purpose. The stacks are generally built on the slope of a

hill, so that the tar is easily collected, and put into barrels; in which state it is brought into this country. The process now described is termed "distillatio per descensum." See PINE.

A more expeditious and economical method of obtaining tar is practised in France and Switzerland. The wood is heated in large brick ovens, constructed for the purpose, and thus it is charred more equally, and the tar is of a more uniform and better quality. In the Vallais the pines are felled in the preceding year, that the wood may be sufficiently dry, and when the outer bark and twigs are stripped off, the remainder of the tree is cut into billets of tolerably equal size. The oven is constructed of stone or brick, of the shape of an egg placed on its small end: the floor is made either of a flat stone, scooped out into a hollow, or of several stones accurately joined together. On one side of it, about five inches above the lowest part, is a hole, in which a gun-barrel is thrust, and this serves to convey off the liquid tar that is collected. A large iron grate is laid at the bottom of the oven. The largest of these ovens are about ten feet high, and five or six feet in the largest diameter. In charging the oven, bundles of billets are thrown in and spread as evenly as possible, the interstices being filled with chips, till the charge nearly reaches the top. The whole is then covered with a layer of chips, and the top of the furnace is closed with flat stones heaped upon one another, gradually lessening the opening, and forming a kind of vaulted chimney, the mouth of which is four or five inches across. The dry chips at the top of the furnace are then set on fire, and the heat spreads downwards, till the whole charge is sufficiently kindled. The chimney is then entirely closed with a large stone, and wet earth is heaped on the stones at top, and thrown on wherever the smoke is observed to burst out too strongly. The melting then begins, and the tar falls to the bottom, fills the hollow of the floor (which detains any bits of wood and other impurities), and runs off through the gun-barrel into casks placed for receiving it. The fire must be occasionally refreshed by letting in a small draught of air through small holes left for the purpose in the sides of the kiln. When the process is finished, the wood, completely charred, is taken out, and the oven, after having been cleared out, is again filled. The red wood and knots, being the richest in resin, are found to yield about one-fourth of their weight of tar; but the general average product is about 10 or 12 per cent. of the weight of the whole charge. After each process, a quantity of "lamp-black" is collected beneath the stones that form the vault of the temporary chimney.

According to Theophrastus, not only the turpentine-trees, the pines, and the firs yield resin or tar, but also the cedars and palm-trees; and the words *pix* and *resin* are taken by Pliny in so large a sense, as to include the weepings of the lentiscus and cypresses, and the balsms of Arabia and Judæa; all which perhaps are near of kin, and in their most useful qualities concur with common tar, especially the Norwegian, which is the most liquid and best for medicinal uses. Those trees that grow on mountains, exposed to the sun or north wind, are reckoned to produce the best and purest tar; and the Idæan pines were distinguished from those growing on the plain as yielding a thinner, sweeter, and better scented tar. Every part of the tree, which is at all resinous, is fit for yielding tar; but the red wood and the hard roots yield the best in quality as well as the greatest in quantity.

Every kind of wood will produce the *pyroligneous* acid (which see), and tar by the destructive distillation. Peat also will yield it in abundance.

There

There is also a kind of tar, the project of making which was suggested by Becher, the celebrated chemist, in the time of king Charles II., which has for several years been prepared from coal in the bishopric of Liege, and in other parts of Germany: we also make considerable quantities in England, especially near Broseley, in Shropshire, and at Bristol. In the bishopric of Liege the coal is distilled in a kind of still, composed of two large cast-iron pots. In England the coal is put into ovens, which are heated by fires lighted under their bottom, and the liquid matter is forced through an iron pipe inserted into the top of the oven, and which communicates with proper condensing vessels. Watson's Chem. Ess. vol. ii. p. 346, &c.

The earl of Dundonald, in Scotland, has lately invented the art of extracting tar and pitch from pit-coal, by a new process of distillation. See Address and Proposals by Sir John Dalrymple, 1784.

A substance resembling tar, called "brai-gras," and much used by the French for careening ships, is made in the following manner. The oven, described in the preceding part of this article, is charged with alternate layers of chips of green wood, and billets of dry, and all the refuse matter of turpentine, &c. Over the whole is laid a stratum of "brai-hee," or rosin, and the gun-barrel pipe is stopped up, and not tapped till the whole of the wood is reduced to charcoal. The vault of the oven is also covered more carefully after the charge is sufficiently kindled, and the whole process is carried on more slowly, and the heat of the fire melts the rosin at the top, which mixes with the resinous sap, and the whole concretes into a dark resinous liquid at the bottom. When it is sufficiently cooled, it is drawn off and barrelled. This "brai-gras" is of an intermediate consistence between tar and rosin. Aikin's Dict.

Tar is properly an empyreumatic oil of turpentine, and has been much used as a medicine both internally and externally.

Tar in substance, mixed with honey, has been found an excellent medicine for coughs.

The ancients esteemed tar good against poisons, ulcers, the bites of venomous creatures; also for pthitical, scrofulous, paralytic, and asthmatic persons. But the method of rendering it an inoffensive medicine, and agreeable to the stomach, by extracting its virtues in cold water, was unknown to them. Siris, sect. 9. 16, 17. 21. 28. See TAR-water, *infra*.

Tar is sometimes given in substance, mixed with so much powdered liquorice, or other such powdery matter, as is sufficient to render it of a fit consistence to be formed into pills. An ointment of tar has been directed in the pharmacopeias, which has been chiefly employed in cutaneous disorders. See UNGUENTUM *e* Pice.

Dr. Cullen mentions an empirical practice, with respect to tar, which is as follows. A leg of mutton is laid to roast, and whilst it is roasting it is basted with tar. Whilst the roasting is continued, a sharp skewer is frequently thrust into the substance of the mutton, so that the gravy may run out: with a mixture of the tar and gravy found in the dripping-pan, the body is to be anointed for three or four nights successively, and during the time the same linen is to be worn. This is alleged to be a remedy in several cases of lepra; and Dr. Cullen knew one instance of its having been employed in a lepra ichthyosis with great success; but he had no opportunities of repeating the practice.

But the chief use of tar is for paying the sides of ships and boats, and their rigging, in order to preserve them from the effects of the weather, which would otherwise crack or rot them.

The tar obtained from the deposition of pyroligneous acid has been recommended as the best preservative for every kind of wood-fence. For this purpose, it should be gently heated in an iron pot, and laid on with a brush. It soaks into the wood, and seems to leave no body, as the artists express it; but after some days' exposure to the sun, the surface and texture of the wood will be much altered; for it will be found so impervious and hard, that it will be very difficult to make any impression upon it. If a second, and especially if a third coat of this tar be put upon wood, it will then *bear out*, as the painters call it, sufficiently well; and Mr. Parkes is of opinion that it will preserve all outside wood-work much more effectually than any other means that have hitherto been employed for the purpose. For ornamental paling, and all outside work, a first, and perhaps a first and second coat of this tar might be used with great advantage; and when these are dry, white lead and oil might be used to finish the work. This substance not only hardens the wood, but effectually preserves it from worms and from all other insects. It will stop the progress of decay, when wood has become worm-eaten. It is observed, however, that this tar is very different from that which is distilled from mineral coal, but which the earl of Dundonald recommended for a similar purpose. The appearance of the application may be very considerably improved by the following preparations; *viz.* 1 gallon of tar, 1 oz. of tallow, 2 oz. of pulverized rosin, melted together and put on warm;—or, 1 gallon of the tar and 2 oz. of pulverized sulphate of iron, used as the other. This tar has also been found an useful varnish for articles made of rolled iron, or of cast-iron. A beautiful varnish for these purposes may be formed by intimately mixing in a gentle heat one gallon of the wood-tar with half a pint of rectified spirits of wine. If this be laid on hot and properly hardened, it will prove a beautiful and durable black varnish. Parkes's Chem. Ess. vol. ii.

Tar may sometimes be found useful as an application for cuts in sheep by clipping, and also to the parts affected by the fly; as well as in those of many other sorts of animals. It is likewise applied to the axles of wheel-carriages, in order to prevent friction, and might probably be still more beneficially made use of in this intention, by having a portion of black-lead incorporated with it, as it would last longer, and be, at the same time, more powerful in obviating the effects of friction.

It is a material which has also been recommended for being applied to the parts of trees from which boughs are taken; in which cases, the faces of the wounded parts and the edges of the bark are to be made perfectly smooth by means of a proper knife; and in a few hours afterwards, or as soon as the parts are become quite dry, they are to be carefully plastered over with the tar, which is similar to that employed for smearing of sheep; or they may be laid over with white or blue lead paint, well mixed with oil, and made rather thicker than that commonly used in painting. The tar is, however, certainly preferable, being of a more adhering, healing nature; and, when laid on in a thin state, is not so apt to fall off in a scaly manner by the action and effects of the weather, as is the case with the other substances.

As the component parts of vegetable tar have been found to consist of oil, resinous matter, pyroligneous acid, and water; that which is of the finest brown colour, has the least acridity, and which is the freest from a dark black appearance, is probably the best and most proper for use in applications as dressings to animals; though the other kinds may be equally or more beneficial in different other intentions.

Tar, when in intimate mixture and union with butter or lard, and the different precipitates of mercury or sulphur, forms

## TAR.

forms an excellent application in different diseases of various kinds of animals, especially those of the skin.

**TAR, Barbadoes.** See BITUMEN, and PETROLEUM Barbadoense.

**TAR, Mineral.** See BITUMEN.

**TAR-Water.** As the cold infusion of tar has been formerly much in vogue, and has been recommended by one of the most learned and ingenious writers of the age, it may not be improper to give some account of its virtues from the bishop of Cloyne's *Siris*, or chain of reflections concerning the virtues of tar-water.

In some parts of America, tar-water is made by putting a quart of cold water to a quart of tar, and stirring them well together in a vessel, which is left standing till the tar sinks to the bottom. A glass of clear water being poured off for a draught, is replaced by the same quantity of fresh water, the vessel being shaken, and left to stand as before. And this is repeated for every glass, so long as the tar continues to impregnate the water sufficiently, which will appear by the smell and taste.

But as this method produces tar-water of different degrees of strength, the author says he chuses to make it in the following manner: Pour a gallon of cold water on a quart of tar, and stir and mix them thoroughly with a ladle or flat stick, for the space of three or four minutes; after which the vessel must stand eight-and-forty hours, that the tar may have time to subside; when the clear water is to be poured off, and kept for use, no more being made from the same tar, which may still serve for common purposes.

This cold infusion of tar hath been used in some of our colonies as a preservative or preparative against the small-pox, which foreign practice induced the bishop to try it in his own neighbourhood, when the small-pox raged with great violence. He says the trial fully answered his expectation; all those within his knowledge, who took the tar-water, having either escaped that distemper, or had it very favourably. Several were preferred from taking the small-pox by the use of this liquor; others had it in the mildest manner; and others, that they might be able to take the infection, were obliged to intermit drinking tar-water. He says, he has found it may be drank with great safety and success for any length of time, and this not only before, but also during the afore said distemper.

The general rule for taking it is, about half a pint night and morning, on an empty stomach, which quantity may be varied according to the case and age of the patient; provided it be always taken on an empty stomach, and about two hours before or after a meal.

It has been found, that several persons infected with cutaneous eruptions and ulcers were immediately relieved, and soon after cured, by the use of this medicine. It is said, that even in the foulest distempers, it proved much more successful than salivations and wood-drinks had done. It also succeeded, beyond expectation, in a tedious and painful ulceration of the bowels, in a consumptive cough, and (as appeared by expectorated pus) an ulcer in the lungs, in a pleurisy and peripneumony. And when a person who had been for some years subject to erysipelatous fevers, perceived the usual forerunning symptoms to come on, the drinking of tar-water prevented the erysipelas.

Tar-water cures indigestion, and gives a good appetite. It is an excellent medicine in an asthma; it imparts a kindly warmth, and quick circulation to the juices, without heating, and is therefore useful, not only as a pectoral and balsamic, but also as a powerful and a safe deobstruent in cachectic and hysterical cases. As it is both healing and diuretic, it is very good for the gravel. The bishop says he

believes it to be of great use in a dropsy, having known it cure a very bad anasarca in a person whose thirst, though very extraordinary, was in a short time removed by the drinking of tar-water. From the success of this medicine in five or six instances, the bishop believes it to be the best and safest, either for preventing the gout, or for so strengthening nature against the fit, as to drive it from the vitals.

It may likewise be safely used in inflammatory cases; and, in fact, hath been found an admirable febrifuge, at once the safest cooler and cordial.

The salts and more active spirits of tar are got by infusion in cold water; but the resinous part is not to be dissolved thereby. Hence the prejudice which some, perhaps, may entertain against tar-water, the use of which might inflame the blood by its sulphur and resin, as a medicine, appears not to be well grounded. It is observed by chemists, that all sorts of balsamic wood afford an acid spirit, which is the volatile oily salt of the vegetable. Herein is chiefly contained their medicinal virtues; and this author affirms, that by the trials he has made, it appears that the acid spirit in tar-water possesses the virtues, in an eminent degree, of that of guaiacum, and other medicinal woods.

It is certain tar-water warms, and therefore some may perhaps still think it cannot cool. The more effectually to remove this prejudice, let it be farther considered, that, as on one hand, opposite causes do sometimes produce the same effect; for instance, heat by rarefaction, and cold by condensation, do both increase the air's elasticity; so, on the other hand, the same cause shall sometimes produce opposite effects. Heat, for instance, in one degree thins, in another coagulates, the blood. It is not therefore strange, that tar-water should warm one habit and cool another; have one good effect on a cold constitution, and another good effect on an inflamed one; nor, if this be so, that it should cure opposite disorders.

A medicine of so great virtue in so many different disorders, and especially in that grand enemy the fever, must needs be a benefit to mankind in general. There are nevertheless three sorts of people to whom the bishop says he would peculiarly recommend it; sea-faring persons, ladies, and men of studious and sedentary lives. See *Two Letters from the Bishop of Cloyne, &c.* published in 1747.

If it be asked, what precise quantity, or degree of strength, is required in tar-water? It is answered, that the palate, the stomach, the particular case and constitution of the patient, the very season of the year, will dispose and require him to drink more or less in quantity, stronger or weaker in degree. Precisely to measure its strength by a scrupulous exactness, is by no means necessary.

It is to be observed, that tar-water should not be made in unglazed earthen vessels, these being apt to communicate a nauseous sweetness to the water.

The same ingenious author recommends tar-water in the plague, and for the distemper among the horned cattle; with what success, must be left to experience.

Though this medicine, says Dr. Lewis, is undoubtedly very far inferior to the character that hath been given of it, it is apparently capable of answering important purposes, as a deobstruent balsamic solution, moderately warm and stimulating. It sensibly raises the pulse, and increases either perspiration or the grosser evacuations. He adds, "I have been informed of some late instances of its good effects in disorders of the leprous kind." *Mat. Med.*

Dr. Cullen thinks that the acid principle gives the virtue to tar-water, and on this account the bishop of Cloyne properly preferred the Norway tar to that of New England, as the former contains more acid than the latter. This eminent

physician acknowledges that he found this preparation in several cases to be a valuable medicine; and that it appeared to strengthen the tone of the stomach, to excite appetite, to promote digestion, and to cure all symptoms of dyspepsia. At the same time, it manifestly promotes the excretions, particularly that of urine. From all these operations, it will be obvious, as the doctor thinks, that in many disorders of the system this medicine may be highly useful. Lewis. Woodville.

It has been lately observed by Dr. Darwin, that the watering of ground with tar-water is capable of destroying the white slug, which is so highly destructive to vegetables.

**TAR-Kettle**, in *Rope-Making*, is made of copper, and holds from ten to twenty barrels of tar. It is set in strong brick-work, and over it is fastened, from side to side, in the direction of the nipper, a bridge, made of three-inch oak-plank, thirteen inches broad, through the middle of which is a mortise for the step to go through, to keep the yarn down and clear of the bottom, when drawing through the kettle. On the side of the kettle next the capstern, is an upright post, twelve inches square, in which is fixed a nipper to press the tar out of the yarn; and a staff, with a weight suspended at the end, is fixed on the side of the nipper to keep it down, that the yarn may imbibe no more tar than is necessary.

**TAR-Rope**, a term used to signify tarred rope, or rope-yarn, such as the thread of old cables, &c. This sort of tar-rope is useful for a great number of different purposes, such as those of tying up the wads or sheaves of beans in the field, and many other similar articles; the fastening of plants and trees to various kinds of supports; and for being applied to a variety of other little uses of the more domestic kind, as being cheap and readily procured.

**TAR**, in *Commerce*, a small silver coin on the coast of Malabar.

**TAR**, in *Sea Language*, a figurative expression for a sailor of any kind.

**TARA**, in *Geography*, a town of Russia, in the government of Tobolsk, on the Irtysh; 220 miles E.S.E. of Tobolsk. N. lat. 57°. E. long. 74° 43'.—Also, a town of Japan, in the island of Xicoco; 28 miles N.N.E. of Ovuthi.

**TARA Hill**, a mountain of Ireland, in the county of Wexford, near the sea-coast; 4 miles N. of Newborough. See **TARAGH**.

**TARA**, the name of a simian hero renowned in the Hindoo epic the Ramayana, for mighty deeds in battle with the hosts of the tyrant Ravana, for the recovery of Sita, the ravished spouse of Rama.

**TARAAN**, in *Geography*, a town of Grand Bucharja; 50 miles E. of Samarcand.

**TARABAD**, a town of Hindoostan, in Baglana; 13 miles E. of Saler Mooler.

**TARABE**, in *Ornithology*, the name of a Brazilian parrot, larger than the common green parrot. Its general colour is green; but its head, breast, and the origin of its wings, are red; its beak and legs are of a dusky grey. Maregrave. See **PITTACUS**.

**TARACASSA**, in *Geography*, a district of South America, in the vicerealty of Buenos Ayres, part of the jurisdiction of Carangas.

**TARAE LAPIS**, the name given by the writers of the middle ages to a stone which they say had the power of stopping all sorts of fluxes. They have left us no description of it, and it seems to have been lost even in their times; for they observe that the physicians used the *sanguis draconis*, or dragon's-blood, in its place.

**TARAGH**, in *Geography*, a small town or rather village

of the county of Meath, Ireland, on the noted hill of Taragh; where the states of Ireland are said to have assembled, and where some pretend that there was a magnificent palace belonging to the kings of Ireland; but as no trace of any such palace is to be found, its having existed must be regarded as improbable. General Vallancey accounted for there being no trace of it, by supposing it to have been made of mud and straw. A Danish invader is also supposed to have taken up his abode here, and to have built the fine Danish fort, or rath, on the south-east side of the hill, which is now beautifully planted. It is 5 miles N. by W. from Dunshaghlin, and 19 miles from Dublin, on the road to Cavan. There are two other hills of the same name, one in the county of Down, and the other in the county of Wexford, both of them near the sea.

**TARAGOT**, or **TARAGALE**, a town of Africa, in the country of Darah; 130 miles S.E. of Morocco.

**TARAGUICO AYCURABA**, in *Zoology*, the Brazilian name for a species of lizard, much approaching to the nature of the taraguira; but its tail is covered from its beginning with small triangular scales, and very regularly marked with four brown spots; the back also, particularly that part which is next the head, is variegated with undulated brown lines. Ray.

**TARAGUIRA**, the name of an American lizard. It grows to about a foot long; its body is rounded, and every where covered with small triangular dusky grey scales; its back is smooth, and it has not that false gullet under the throat which the iguana has.

This is the species of lizard of which it is reported, that it will wake a sleeping person, if it see him in danger of being bitten by a serpent. It is very common about houses and gardens in South America, and runs very swiftly, but with a waddling motion; and when it sees any thing at a distance, has an odd way of nodding its head very swiftly. Ray.

**TARAGUPALA**, in *Geography*, a town of Hindoostan, in Tellingana; 25 miles N.W. of Warangole.

**TARAKLI**, a town of European Turkey, in Bessarabia; 24 miles S.S.W. of Bender.

**TARALEA**, in *Botany*, a barbarous name of Aublet's. See **DIPTERYX**, species 2d.

**TARAMA**, in *Geography*, a jurisdiction of Peru, in the audience of Lima. The air is healthy, and the soil fertile.

**TARAMAMON**, a name given by Loubere to a ridge of mountains that passes E. and W. in Siam, not far to the north of Yuthia.

**TARAMANDAHU**, a river of Brasil, which runs into the Atlantic, S. lat. 30° 40'.

**TARAMEH, AL**, a town of Egypt, in ruins; 2 miles N.E. of Tineh.

**TARAMUNDE**, a town of Spain, in Asturia; 45 miles W. of Ovi do.

**TARANCON**, a town of Spain, in New Castile; 33 miles S.E. of Madrid.

**TARANDUS**, in *Entomology*, a species of *Lucanus*; which see.

**TARANDUS**, in *Zoology*, a name given by Agricola, and some other authors, to the rein-deer. See **CERVUS Tarandus**.

**TARANIOLO**, in *Ornithology*, a name by which the whimbrel, or small curlew, called the *arquata minor* by authors, is known in the markets of Italy.

**TARANIS**, probably from *taran*, thunder, in *Ancient Mythology*, a name given by the Gauls to Jupiter, under which appellation they sacrificed human victims to him.

Taranis

Tarans corresponded to the Jupiter Tonans of the Romans. See THOR.

TARANNON, in *Geography*, a river of North Wales, which runs into the Severn; 4 miles W. of Newtown in Montgomeryshire.

TARANSA, one of the Western islands of Scotland, about four miles in length, and two in breadth, where widest, but in some places scarcely half a mile across; 5 miles N.E. from Toe-Head. N. lat.  $57^{\circ} 52'$ . W. long.  $6^{\circ} 59'$ .

TARANTA, the name of mountains of Abyssinia, that lie on the east of the kingdom.

TARANTARA, according to Ennius, the military trumpet's flourish of the Romans.

TARANTELLA, a rapid tune played to persons in Calabria, supposed to be bitten by the tarantula, in order to excite them to dance, which has been thought, while the disease was believed, to be the only specific.

TARANTISMUS, in *Medicine*, the disease or affection of those bit by the tarantula.

The patients under this malady are denominated *tarantati*.

Dr. Cornelio, in the Philosophical Transactions, represents this as an imaginary disease; and tells us, that the tarantati, or those that think themselves seized with it, (excepting such as for particular ends feign themselves so,) are most of them young wanton girls, such as the Italian writers call *Donne di sale*, who, falling from some particular indisposition, into melancholy madness, persuade themselves, according to vulgar prejudice, that they have been bitten by a tarantula.

But the evidence, on the other side of the question, has gained considerable credit, as will appear from the article TARANTULA.

TARANTOLA, in *Geography*, a town of Naples, in Abruzzo Citra; 10 miles E.N.E. of Sulmona.

TARANTULA, or TARENTULA, in *Natural History*, a venomous insect, whose bite gives name to a new disease, called *tarantismus*.

The tarantula is a kind of spider, the *aranea tarantula* of Linnæus, so denominated from the city of Tarentum, in Apulia, near which it is chiefly found. It is also called *phalangium Apulum*. Valetta, a monk of Apulia, who had always resided about the places where this mischievous animal is most frequent, and had many opportunities of tracing its several qualities, published a succinct, but very accurate history of it in the year 1706, under this name.

It has its name *phalangium*, from the three phalanges or joints of its legs, and this name equally suiting many other spiders, as well as this, it ceased to be its appropriated name, and was applied as a generical term to several other spiders of the larger kind, among which this species was always distinguished by the epithet *Apulian*, from the place where it was so frequently found.

The tarantula, or Apulian phalangium, is frequent in all parts of this country, in uncultivated places, but more especially it breeds most in sunny dry hills, and particularly in such parts of them as are exposed to the south.

It is said not to be found any where except in Apulia, but probably it is an inhabitant of many other places, though its poison may not be violent enough any where else to bring on the effects it does there: as we find in vipers and many other poisonous creatures, that the strength of their poison differs greatly in degree in different places.

M. Geoffroy says, that it is the opinion of some that the tarantula is never venomous but in the coupling season; and Baglivi says, that it is never so but in the heat of

summer; particularly in the dog-days, when, becoming enraged, it flies on all that pass by.

As this spider is very tender, and easily injured by cold winds and rain, it always digs itself a cave in the side of a hill for its habitation; and usually chuses for this purpose the hardest ground it can find, which is better able to defend it, and which it easily works into, with its forceps and claws. This always is hollowed upward in the hill, and by that means is safe from wet, all the water in rainy seasons running down over its top. Sometimes it burrows itself a cave in a valley or plain, but then it always chuses a dry, usually a chalky soil. In this case, the entrance into its cave is small, and within, there are several winding passages: if it happens to be surpris'd with wet in this place, from hard rains, it quits the floor and hangs by its feet against the top of the cave. It preys upon a number of small insects, with which the fields of Apulia abound, and seldom appears in the day-time, but creeps out about the time of sun-set, and preys at large upon the animals which are then betaking themselves to rest; without the danger it would be exposed to from its own enemies by day-light. If at any time he remains the whole evening in his cave or den, it is only to practise another method of hunting his prey. In this case, he comes forward to the mouth of the hole, and there lies in wait; his fore-legs are placed at the extremity of the hole, and his eyes have a clear view all round. The other insects are not aware of this trick, but as they walk near his hole he bursts out upon them, and seizing them, he conveys them into his habitation; where, as soon as he has eaten them, he retires back into his cell to dispose of the wings and other fragments, till he can carry them out at a more convenient time, and then places himself in his former posture for another prey.

The peasants of Apulia have a method of getting him out of his hole in the day-time, in order to destroy him. This they do by making a soft hissing noise through an oat straw: whether it be that the creature loves this sound, or rather that he takes it for the voice of some insect that he is used to prey upon, he always comes out, and falls a sacrifice to his greediness.

The creature has eight legs, and walks very well; his legs have each three joints, and are covered with a fine downy hairiness; they are of a whitish colour at the bottom, and variegated with black lines, and are wholly black in their upper part, where they are joined to the breast: these all arise from a kind of oval shield, which is placed upon the breast, and is black, hairy, and very hard: this is called by some the *speculum* of the tarantula. From the shoulders there grow a pair of horns, at least they are usually called so, though they seem much better to deserve the name of *arms*; the use of these is to hold fast the prey, that it may not be able to escape while he is killing it with his forceps: these horns or arms have the same number of joints that the legs have, but they greatly differ from the legs, in that they are shorter, and of a yellowish colour; they are also covered with a longer and thicker hair, for the more certainly holding the prey, and are terminated by black claws, and they are much smaller and more capable of motion every way. The belly is either white, or of a pale yellow, and is marked with a transverse black streak: this is surrounded with several other small spots of the same colour, and is clothed with a very fine and short down; the whole body beside is covered with longer hairs, and is of a whitish or brownish colour; the apex of the head, the shield of the breast, and the ends of the forceps, are as hard as a crab's claws; but the rest of the body is covered with a tender supple skin: the eyes are

## TARANTULA.

very large, and of a fine shining black; they are continually in motion, and, when seen in the night, or in a dusky place, they shine like the eyes of a cat. In the place where the mouth is placed in other animals, there arises in this a black hard forceps; the upper part of this instrument is covered with a yellow hairiness, and it is terminated by extremely fine and sharp claws, which the creature can open or close up at pleasure. While the arms hold the prey in a proper position, these sharp points make wounds in the body, and the other parts of the forceps squeeze the body till all its juices are pressed out, and the creature feeds on them: the mouth is placed much below these, and stands exactly in the proper place to receive the juices expressed by this operation. The tarantula sleeps in his cave the whole winter, and a great part of the autumn and spring; and if during this time he is ploughed up, as is often the case, or in any other way taken out of his hole, he is found quite torpid and numbed, and is unable to do any mischief by biting.

The hole or mouth of a tarantula's cave always gives some idea of the size of the creature within: he makes it small if he enters it while young; and as he grows larger, he eats away more and more of the earth to widen it still more, so that the diameter of it is usually about equal to the diameter of the body. The size of a chestnut is about the standard of a full-grown tarantula; but there are some old ones found much larger and more hairy. The female is known from the male by having longer legs and a larger belly. They copulate in June and July, and at that season the females are often met with in the fields carrying the males upon their backs. In August and September they lay their eggs, which remain the whole winter; and in the summer after are hatched.

Pliny tells a story of the young ones always eating up their mother for the first food, which is countenanced by the relation of the peasants in those parts, who say that they all swarm about her and suck her juices from many places at once, till they leave her a lifeless carcase on the field, and then go each their several ways in search of other food. The bite of the tarantula, as it is called, is not properly a bite, but a wound inflicted in a very peculiar manner. The creature pierces the skin with its forceps, and at that instant injects from its mouth a poison into the wound. The time in which their wounds are fatal, is that of their copulation; at this time they are in their utmost vigour and power of hurting. People of fashion are rarely hurt by them, but principally the poor labourers, who sleep half naked in the field, and the women who travel the country with naked feet, gathering medicinal herbs.

The bite occasions a pain, which at first seems much like that felt on the stinging of a bee, or an ant: in a few hours the patient feels a numbness, and the part affected becomes marked with a little livid circle, which soon after rises into a very painful tumour; a little after this he falls into a profound sadness, breathes with much difficulty, his pulse grows feeble, and his senses fail; at length he loses all sense and motion; and dies, unless relieved. But these symptoms come somewhat differently, according to the nature of the tarantula, and the disposition of the patient. An aversion for black and blue; and, on the contrary, an affection for white, red, and green; are other of the unaccountable symptoms of this disease.

All the assistance medicine has been able to discover by reasoning, consists in some surgical applications on the wound, and in cordials and sudorifics; but these are of little efficacy: a thing that avails infinitely more, is, what reason could never have discovered—music.

As soon as the patient has lost his sense and motion, a musician tries several tunes on an instrument; and when he has hit on that, the tones and modulations of which agree with the patient, he is immediately seen to make a faint motion: his fingers first begin to move in cadence, then his arms, then his legs, by degrees his whole body; at length he rises on his feet, and begins to dance; his strength and activity still increasing. Some will continue the dance for six hours without intermission.

After this he is put to bed, and when he is judged sufficiently recruited from his first dance, he is called out of bed, by the same tune, for a second.

This exercise is continued for several days, six or seven at least; in which time the patient finds himself exceedingly fatigued, and unable to dance any longer; which is the characteristic of his being cured; for as long as the poison acts on him, he would dance, if one pleased, without any discontinuance, till he died of the mere loss of strength.

The patient, on this, perceiving himself weary, begins to come to himself; and awakes as out of a profound sleep; without any remembrance of what had passed in his paroxysm, not even of his dance.

Sometimes the patient, thus recovering from his first access, is quite cured; if he be not, he finds a melancholy gloom hanging on him; he shuns the sight of men, and seeks water; and, if he be not carefully looked to, throws himself into some river. If he do not die, the fit returns at that time twelvemonth, and he is driven to dancing again. Some have had returns regularly for twenty or thirty years.

Every tarantula has his particular and specific tune; but, in the general, they are all very brisk, sprightly ones, that work cures.

This account was given in the Royal Academy of Sciences, by M. Geoffroy, at his return from Italy, in 1702, and confirmed by letters from F. Gouye. The like history is given by Baglivi, in an express dissertation on the tarantula, published in 1696.

Authors are divided about the nature of the poison of the tarantula. Cardan says it is a cold one, and Scaliger says it is a hot one; but, be this as it will, Valetta informs us, that its effect is very sudden; it is no sooner received into the flesh, but the veins take it up and carry it to the heart, where it becomes diffused through the whole mass of blood, and gives an immediate trembling of the limbs, and a difficulty of breathing. The next part it seizes is the brain, where it produces different effects in different subjects; and, according to their state of health, and the condition of their juices, brings on various species of phrensies. The patient has a thousand phantasms, sometimes all jovial and merry ones, and sometimes imaginary scenes of blood and cruelty. Some are fond of seeing little streams of water trickling down into a basin; others are never easy unless they have green leaves before them: this indeed is almost an universal symptom. Some are delighted with various colour, and some are fond of violent motion, such as dancing, leaping, and the like; and some are in love with slow and graceful movements, as walking majestically, bowing, and dancing slow dances. Some are military mad, and call out for the noise of drums and trumpets, and the clashing of sword; but all of them, as well the brisk and noisy, as the lurching and dull, are pleased with music.

They will get up and dance to any instrument; and the moment it ceases playing, they will fall down to the ground as if apoplectic, and not stir again till the music is renewed. Many people have laughed at the whole history of the bite of a tarantula, from this one accident of its poison being cured

cured by music; but all who have been upon the spot attest it. Valett. de Phaleng. Apulo.

To such extraordinary facts, it is no wonder a few fables should be added; as, for instance, that the patient is no longer infected than while the insect lives; and that the tarantula itself dances, all the while, to the same air with the person bitten.

Dr. Dominico Cirillo, professor of natural history at the university of Naples, positively contradicts the testimonies above recited. Having had an opportunity of examining the effects of this animal, in the province of Taranto, where it is found in great abundance, he affirms that the surprising cure of the bite of the tarantula by music, has not the least truth in it; and that it is only an invention of the people, who want to get a little money, by dancing when they say the tarantism begins. He makes no doubt but the heat of the climate contributes very much to warm their imagination, and to throw them into a delirium, which may be in some measure cured by music: but several experiments have been tried with the tarantula; and neither men nor animals, after the bite, have had any other complaint, except a very trifling inflammation on the part, like that produced by the bite of a scorpion, which goes off by itself without any danger at all. In Sicily, where the summer is still warmer than in any part of the kingdom of Naples, the tarantula is never dangerous, and music is never employed for the cure of the pretended tarantism. It is without doubt very extraordinary, says this writer, that a man of sense, and a physician of great learning, as Baglivi was, should have been satisfied with the account of this disorder; and that, instead of examining the facts by experiments, he should rather have tried to explain it: but even philosophers like very much to meet with wonderful and extraordinary things, and though they are against all reason, still they want them to be true, and endeavour to find out the cause of them. Every year this surprising disorder loses ground; and he is persuaded, that in a very little while it will entirely lose its credit. The Neapolitan physicians all look upon the tarantula in the same light, particularly after the ingenious book published on this subject by the learned Dr. Serapio; who, by various experiments, has proved, that the bite of the tarantula never produced any bad effects, and that music never had any thing to do with it. Phil. Transf. vol. lx. art. 22.

The bite of the tarantula, and the method of its cure, were, however, for many years subjects of elaborate discussion; and different theories were proposed for explaining them, some account of which it may not be improper to preserve.

*Theory of the Tarantula's Bite*, by M. Geoffroy. The poisonous juice injected by the tarantula, M. Geoffroy conceives, may give the nerves a degree of tension greater than is natural to them, or than is proportionate to their functions: and hence may arise a privation of knowledge and motion. But, at the same time, this tension, equal to that of some strings of an instrument, puts the nerves in unison to certain tones, and obliges them to shake, after being agitated by the undulations and vibrations of the air proper to those tones. And hence this wonderful cure by music: the nerves, thus restored to their motion, call back the spirits thither, which before had abandoned them.

It may be added, with some probability, and on the same principles, that the patient's aversion for some colours arises hence, that the tension of his nerves, even out of the paroxysm, being still different to what it is in the natural state, the vibrations those colours occasion in the fibres of the brain,

are contrary to their disposition, and occasion a kind of dissonance, the effect of which is pain.

*Theory of the Effects of the Tarantula's Bite*, by Dr. Mead. The malignity of the poison of the tarantula seems to consist in its great force and energy, whereby it immediately raises an extraordinary fermentation in the whole arterial fluid, by which its texture and crasis are considerably altered: the consequence of this alteration, when the ebullition is over, must necessarily be a change in the cohesion of its parts, by which the globules, which did before with equal force press each other, have now a very differing and irregular nifus, or action; so that some of them do so firmly cohere together, as to compose moleculeæ, or small clusters: upon this account, as there is now a greater number of globules contained in the same space than before, and the impulse of many of these, when united together, differing according to the conditions of their cohesion, as to magnitude, figure, &c. the impetus with which this fluid is driven towards the parts, will not only be seen at some strokes greater than ordinary, but the pressure upon the blood-vessels must be very unequal and irregular; and this will be particularly felt in those which are most easily distended, as those of the brain, &c.

Upon this, the nervous fluid must necessarily be put into various undulatory motions, some of which will be like those, which different objects, acting upon the organs or passions of the mind, do naturally excite in it; upon which such actions must follow in the body, as are usually the consequences of the several species of sadness, joy, despair, or the like determinations of thought.

This, in some degree, is a coagulation of the blood, which will, the more certainly, when attended with uncommon heat, as is the case in those countries where these creatures abound, produce such like effects as these: because the spirits separated from the blood thus inflamed, and compounded of hard, fixed, and dry particles, must unavoidably share in this alteration; that is, whereas their fluid consists of two parts, one more active and volatile, the other more viscid and glutinous, which is a kind of vehicle to the former; their active part will bear too great a proportion to the viscid; and consequently they must have more than ordinary volatility and force; and will, therefore, upon the least occasion imaginable, be irregularly determined to every part.

Whereupon will follow tremblings, anger, or fear, upon a light cause; extreme pleasure at what is trivial, as particular colours, or the like; and, on the other hand, sadness at what is not agreeable to the sight; nay laughter, obscene talk and actions, and such other symptoms as attend persons bit; because, in this constitution of nervous fluid, the most slight occasion will make as real a reflux and undulation of it to the brain, and present as lively species there, as the strongest cause and impression can produce in its natural state and condition: nay, in such a confusion the spirits cannot but sometimes, without any manifest cause at all, be hurried towards those organs, to which, at other times, they have been most frequently determined; and every one knows which these are in hot countries.

The effect of music on persons touched with this poison confirms the doctrine above delivered. For muscular motion, we know, is no other than a contraction of the fibres, from the arterial fluid's making an effervescence with the nervous juice, which, by the light vibration and tremor of the nerve, is derived into the muscle.

Thus there is a twofold effect and operation of the music, that is, upon the body and the mind: a brisk harmony excites

eites lively species of joy and gladness, which are always accompanied with a more frequent and stronger pulse, or an increased impulse of the liquor of the nerves into the muscles; upon which suitable actions must immediately follow.

As for the body, since it was sufficient to put the muscles into action, to cause those tremors of the nerves, by which their fluid is alternately dropped into the moving fibres, it is the same thing whether it be done by the determination of the will, or the outward impressions of an elastic fluid: such is the air; and that sound, which is the vibrations of it, is beyond dispute: these, therefore, rightly modelled, may shake the nerves as really as the *imperium voluntatis* can do; and, consequently, may produce the like effects.

The benefit of music arises not only from their dancing to it, and so evacuating by sweat a great part of the inflammatory fluid; but, besides this, the repeated percussions of the air hereby made, by immediate contact, shaking the contractile fibres of the membranes of the body, especially those of the ear, which, being contiguous to the brain, communicate their tremblings to its membranes and vessels: by these continued successions and vibrations, the cohesion of the parts of the blood is perfectly broken, and the farther coagulation prevented; so that the heat being removed by sweating, and the coagulation by the contraction of the muscular fibrillæ, the wounded person is restored to his former condition.

If any one doubts of this force in the air, he may consider, that it is demonstrated in mechanics, that the smallest percussion of the smallest body may overcome the resistance of any the greatest weight, which is at rest; and that the languid tremor of the air, which is made by the sound of a drum, may shake the largest edifices.

But, besides this, we must allow a great deal to the determinate force, and particular modulation of the trembling percussions; for contractile bodies may be acted upon by one certain degree of motion in the ambient fluid, though a greater degree of it, differently qualified, may produce nothing at all of the like effect. This is not only apparent in two common-stringed musical instruments, tuned both to the same height; but also in the trick which many have of finding the tone or note peculiarly belonging to any wine-glass, and, by accommodating their voice exactly to that tone, and yet making it loud and lasting, make the vessel, though not touched, first to tremble, and finally to burst; which it will not do, if the voice be either too low, or too high.

This makes it no difficult matter to conceive, why different persons, infected with this sort of venom, do require a different sort of music, in order to their cure; inasmuch as the nerves and distractile membranes have different tensions, and consequently are not all alike to be acted upon by the same vibrations.

TARANTULA, in *Zoology*, is also the name given by the Italians to a peculiar species of lizard, called by Aldrovand, and some others, *lacertus facetanus*.

It is of a grey colour; its skin is extremely rough; and it is thicker and rounder bodied than the other lizards. It is found, like our common est, under old walls, and among the ruins of buildings, particularly in the neighbourhood of Rome, in great plenty; its colour looks dead and ghastly, and it is as odious to the sight among the Italians, as the toad is with us, being never seen without a sort of natural horror. It is esteemed also a poisonous creature, as the toad is with us; though it is not easy to find well-attested stories of any body's ever having been hurt either by the one or the other of these creatures. Ray.

TARAPACA, in *Geography*, a town of Peru, in the bishopric of Arquipa, on a river which soon after runs into the Pacific ocean, S. lat. 20° 10'.

TARAPILLY, a town of Hindoostan, in Coimbatore; 20 miles N.E. of Damiccotta.

TARARE, a town of France, in the department of the Rhône and Loire; 18 miles W.N.W. of Lyons.

TARAS, in *Ancient Geography*, a small river of Italy, which passed to Tarentum, and probably gave it its name.—Also, a river of Italy, in Japygia.—Also, a river of Epirus.—Also, a town of Asia Minor.—Also, a river of Scythia.

TARAS, in *Geography*, a town of the duchy of Wurzburg; 2 miles N.W. of Hasfurt.

TARASCO, in *Ancient Geography*, a town of Gallia Narbonensis, on the left of the Rhone, and west of Arlate.

TARASCON, in *Geography*, a town of Spain, in New Castile; 22 miles S.W. of Huete.—Also, a town of France, and principal place of a district, in the department of the Mouths of the Rhône, on the Rhône, with a castle, fortified in the ancient manner. It is situated opposite Beaucaire, with which it communicates by means of a bridge of boats. The number of inhabitants is about 7000; 3 posts E. of Nîmes. N. lat. 43° 48'. E. long. 4° 44'.—Also, a city of France, and capital of the department of the Arriege, on the river Arriege. In it are several manufactures of iron; 48 miles S. of Toulouse. N. lat. 42° 50'. E. long. 1° 41'.

TARASOVA, a town of Russia, in the government of Irkutsk, on the Lena; 12 miles S. of Tutura.

TARATATO, a town on the east coast of Fortaventura, one of the Canary islands.

TARAUMARA, a large province of North America, in the north-east part of New Biscay, bounded on the west by Sonora, on the east by New Mexico, its limit being the Rio Bravo. On the south-west it borders on Cinaloa. Alcedo computes the extent at 100 Spanish leagues from east to west, and as much from north to south. This province was discovered in 1614, and derives its name from a savage nation found there, of pacific dispositions. This province contains 48 pueblos, or villages, or stations of Franciscan missionaries, exclusive of the capital of St. Felipe de Chiguaga. It is chiefly rich in mines, the minerals being smelted at the Real, or royal station of St. Eulalia, or probably the Real Nueva in the maps, in N. lat. 29° 36'.

TARAXACUM, or TARAXACON, in *Botany*, a name used by the Arabians, supposed by Ambrosini to have been derived from the Greek *ταραχος*, *catable*, because the plant to which it was applied, (our Dandelion, or something nearly akin,) was used for food. De Theis derives it, with more appearance of probability, from *ταρασσω*, *to move*, or *trouble*, because of the laxative and diuretic quality of the plant in question, commemorated in its vulgar English, as well as French, appellation. See LEONTODON; at the end of which botanical article, we must observe, *genus of Leontodon* is printed by mistake for *gender*.

TARAXIPPUS, formed of *ταρασσω*, *I frighten*, and *ιππος*, *horse*, a kind of evil genius, the statue of which was erected in the Grecian hippodromes, in order to alarm and frighten the horses in their course. The shape and form of this strange deity are not described; but he certainly answered the end for which he was designed; it frequently happening, that the horses were so scared at his appearance, as to turn away with the utmost violence, and expose the lives of their riders or drivers to the most imminent danger. Many conjectures have been formed concerning this strange deity, and the means he used to frighten the horses: but the most probable

hable conclusion will be, perhaps, to suppose that some tricks and artifices were practised under the disguise of this figure, either with a design to render the victory more honourable in proportion to the difficulty of gaining it, or else that this horse-frightening deity was placed in the course as a touch-stone, to prove the resolution and temper of the horses; and to oblige the candidates to bring none into the field but such as by exercise and discipline were so assured and steady, as not to let their obedience be shaken upon the most trying occasions. Berenger's Hist. and Art of Horsemanship, vol. i. p. 54. See STADIUM.

TARAXIS, from *ταρασσω*, to disturb, in Surgery, a slight ophthalmy, or inflammation of the eye. See OPHTHALMY.

TARAZ, in Geography, a river of Independent Tartary, which runs into the Sirr or Jaxartes at Otrur. Some suppose this to be the same with the river Tulas; but others represent it as a much more inconsiderable stream.

TARAZ, or *Turkestan*, a city of Asia, and capital of the country of Turkestan, situated on a small river which runs into the Sirr, 250 miles N. of Samarcand. N. lat.  $44^{\circ} 45'$ . E. long.  $69^{\circ} 42'$ .

TARAZONA, a town of Spain, in New Castile; 15 miles S. of Alarçon.—Also, a city of Spain, in Aragon, the see of a bishop, suffragan of Saragossa. This town is ancient, and was destroyed by the Moors in the year 724, and by the same people rebuilt in the beginning of the 12th century; 43 miles N.W. of Saragossa. N. lat.  $42^{\circ}$ . W. long.  $1^{\circ} 43'$ .

TARBA, in Ancient Geography, a town situated on the southern coast of the isle of Crete.

TARBASON, a word used by some chemical writers as a name of antimony.

TARBASSUS, in Ancient Geography, a town of Asia, in Pisidia.

TARBAT, in Geography, a town of Scotland, in the county of Cromarty. This parish originally belonged to the county of Ross, but was separated from it and annexed to Cromarty, in 1693; 6 miles E. of Tam.

TARBAT Ness, a cape of Scotland, on the east coast of the county of Ross, between the friths of Dornoch and Murray. N. lat.  $37^{\circ} 50'$ . W. long.  $3^{\circ} 40'$ .

TARBE, a city of France, and capital of the department of the Upper Pyrenées, built on the ruins of the ancient Bigorre: before the revolution it was the see of a bishop, and residence of a governor. It consists principally of one street along the Adour, and is defended by a castle;  $7\frac{1}{2}$  posts S. of Auch. N. lat.  $43^{\circ} 14'$ . E. long.  $0^{\circ} 8'$ .

TARBELLI, in Ancient Geography, a people of Gaul, in Aquitania, whose territory extended along the Aquitanic gulf.

TARBERT, in Geography, a post-town of the county of Kerry, Ireland, on the river Shannon, where there is a charter-school. It is 124 miles S.W. from Dublin. There is also a small island of this name off the coast of Galway.

TARBIDO, or MARAZZO, a river of Naples, which runs into the Mediterranean, 13 miles S.W. of Cosenza.

TARBOU, a town of Hungary, on the river Theye; 14 miles N.N.E. of Kifwarda.

TARBURGH, or TARBOROUGH, a town of North Carolina, on the Tar; 45 miles N.N.W. of Newbern. N. lat.  $35^{\circ} 52'$ . W. long.  $77^{\circ} 44'$ .

TARBUT, a city of Persia, in Khorassan, eight fursungs distant from Turshish; with a population of about 8000 persons, defended by a strong wall, and flanked with towers. Provisions are here plentiful and cheap; it has 220 dependent

villages, and is possessed by Isa Khan, a powerful chief, who can bring into the field an army of 10,000 men.

TARCHI, in Biography, a Neapolitan composer, who arrived in England in 1786, at the same time as Rubinelli. He was young at that time, but though he remained here only one season, he discovered considerable abilities, and seemed advancing rapidly into fame. He had fire, taste, and invention. If he still lives, we make no doubt but that he ranks high among the dramatic composers of his country.

TARCHONANTHUS, in Botany, so called from *tarcon*, or *taracon*, the Arabic name of *Artemisia Dracunculus*, our Taragon, and *ανθος*, a flower, because its flowers resemble those of that plant. Vaillant contrived this name in the Mem. de l'Acad. des Sciences, for 1719, but it is not one of his happiest.—Linn. Gen. 416. Schr. b. 547. Willd. Sp. Pl. v. 3. 1792. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 515. Juss. 185. Lamarck Illustr. t. 671. Gært. t. 166.—Class and order, *Syngenesia Polygamia-aqualis*. Nat. Ord. *Compositæ Nucamentaceæ*, Linn. *Corymbifera*, Juss.

Gen. Ch. *Common Calyx* turbinate, of one leaf, cut half way down into (for the most part) seven rather acute segments, coloured internally, shorter than the corolla, permanent. *Cor.* compound, uniform, of about twenty florets, all perfect, equal, each of one petal, funnel-shaped, with five teeth. *Stam.* in each floret, filaments five, capillary, very short; anthers united into a cylindrical tube, as long as their own partial corolla, with a filamentous appendage at the base. *Pist.* in each floret, Germen inferior, oblong; style twice the length of the floret; stigmas two, divaricated. *Peric.* none, except the permanent calyx. *Seeds* solitary, ovate-oblong, compressed. *Down* woolly, investing every part of the seed. *Recept.* minute, clothed with woolly hairs, the length of the calyx.

Obf. The *seed-down* is very remarkable, as not crowning but entirely investing the seed. *Linneus*.

Eff. Ch. *Receptacle* villous. *Seeds* invested with hairs. *Common calyx* of one leaf, turbinate, cut half way down into several segments. *Anthers* spurred at the base.

1. *T. camphoratus*. Shrubby African Fleabane, or Aromatic Taragon-blossom. Linn. Sp. Pl. 1179. Suppl. 361. Willd. n. 1. Ait. n. 1. (*Elichryso affinis africana arborescens, floribus purpureo-vioiaceis, foliis Salviae, odore Rosmarini*; Herm. Lugd.-Bat. 228. t. 229. Pluk. Phyt. t. 174. f. 1.)—Leaves elliptic-oblong, nearly entire; densely downy beneath. Native of the Cape of Good Hope, from whence it was brought very early into the gardens of Europe. This is a greenhouse evergreen shrub, or small tree, flowering from June to October. The branches are angular, tuberculated, densely downy and hoary. Leaves scattered, stalked, two or three inches long, more or less acute, somewhat wavy, entire or minutely toothed; their upper side of a dark dull green, quite smooth, reticulated with fine veins; the under white and cottony, with a prominent rib and veins. When bruised they smell like rosemary, but less agreeably. *Panicles* terminal, many-flowered, with numerous lanceolate bracts, all together hoary, like the branches. Segments of the calyx from five to seven, or more. *Florets* dark dull purple, with whitish anthers. *Seeds* enveloped in copious white wool, like those of an *ERIOCEPHALUS*; see that article.

2. *T. ellipticus*. Oval-leaved Taragon-blossom. Thunb. Prodr. 145. Willd. n. 2.—“Leaves elliptical, finely toothed; densely woolly beneath.”—Gathered by Thunberg at the Cape. We have seen no authentic specimen from him, but there are some in the Linnæan herbarium which answer to the

the specific character, though they are obviously a mere variety of the foregoing.

3. *T. racemosus*. Cluster-flowered Taragon-blossom. Thunb. Prodr. 145.—“Leaves elliptical, pointed, finely toothed; densely woolly beneath.”—From the same country. This is perhaps but another variety. The leaves of *T. camphoratus* vary in acuteness. Willdenow seems accidentally to have omitted this in transcribing. It should have been his n. 3.

4. *T. lanceolatus*. Lanceolate Taragon-blossom. Thunb. Prodr. 145. Willd. n. 4.—“Leaves elliptical, entire, smooth.”—Gathered at the Cape by Thunberg. His specific name is exceptionable, when compared with the characters of this and the rest of the species. We must rely on him for the synonyms of the following, it being his own discovery; or we should have presumed, without seeing specimens, that the plant before us might be *T. glaber* of Linnæus.

5. *T. dentatus*. Toothed Taragon-blossom. Thunb. Prodr. 145. Willd. n. 5. (*T. glaber*; Linn. Suppl. 360, according to Thunberg.)—“Leaves oblong, entire or toothed; slightly downy beneath.”—Gathered by Thunberg at the Cape. We have seen no specimen. Linnæus describes his plant as extremely like *T. camphoratus*, but quite smooth, and without any smell. It varies with narrower or broader leaves, sometimes entire, sometimes toothed.

6. *T. ericoides*. Heath-like Taragon-blossom. Linn. Suppl. 360. Willd. n. 6.—Leaves oblong, smooth, imbricated in four rows. Calyx in four deep segments.—Native of the Cape of Good Hope. A rigid shrub, with copious, round, irregular branches, whose points sometimes taper into a spinous point. Leaves like those of many *Erica*, minute, scarcely a line in length, elliptic-oblong, obtuse, entire, concave, smooth on both sides, dotted, aromatic when rubbed, imbricated in four rows on the very short, opposite, lateral shoots. Flowers solitary at the end of those shoots, each on a short silky stalk. They are erroneously termed “*conferti*” in the *Supplement*, being no otherwise crowded than because the little branches which bear them are so. Calyx in four very deep, elliptical, smooth, reddish divisions, very aromatic. Florets few, minute, concealed in the copious woolly hair, which is twice the length of the calyx.

Linnæus justly observes of this last species, that its genus is rather doubtful. We conceive it might as readily be supposed an *Eriocephalus*, and if the leaves could by any means be called filiform, we might guess it to be *E. glaber*, Thunb. Prodr. 168, a species not adopted in our account of that genus; (where Lamarck Illustr. t. 717, ought to have been quoted after Juss. 186.) The above conjecture is strengthened by Thunberg’s having mentioned no *Tarchoanthus ericoides*, nor, as far as we can discover, has he described the shrub in question under any other name. We beg leave to remark that the species of this whole genus, except the original one, are involved in much uncertainty, nor are the materials with which we are furnished sufficient to enable any botanist to form an opinion about them.

TARCHOANTHUS, in *Gardening*, contains a plant of the shrubby evergreen exotic kind, of which the species that is most commonly cultivated is the shrubby African fleabane, (*T. camphoratus*), which has a strong woody stem, that rises to the height of twelve or fourteen feet, sending out many woody branches at the top, which may be trained to a regular head.

*Method of Culture*.—This is a plant that may be increased

by cuttings, which should be planted out in the spring or early summer seasons, in pots filled with light mould, giving them shade and water occasionally. They soon strike root, and in three or four months may be potted off into separate pots, affording them shade and water as before, and placing them under shelter. They also strike root in the summer season, when planted in a common border, and covered with hand-glasses, and may in these cases be potted off in the autumn.

Afterwards they require the management of other hardy greenhouse plants. The plants do not produce ripe seeds in this climate.

They afford variety in these different situations.

TARDA AVIS, in *Ornithology*, a name given by many to the bustard, more commonly known among authors by the name *otis*.

TARDETS, in *Geography*, a town of France, in the department of the Lower Pyrenees; 6 miles S. of Mauléon.

TARDIGRADUS, or SLOTH, in *Zoology*. See BRADYUS.

TARDO, in the *Italian Music*, is used to denote a slow movement, being much the same as *largo*.

TARDOIRE, or TARDOTERE, in *Geography*, a river of France, which runs into the Charente, near Rochefoucault.

TARDOU, EL, a town of Spain, in the province of Cordova; 28 miles W. of Cordova.

TARDSONG, a town of Thibet; 250 miles E. of Lassa. N. lat. 29° 54'. E. long. 95° 34'.

TARE, in *Botany*. See VETCH.

TARE, in *Agriculture*, a well-known plant of the vetch kind, of which there are two sorts; the common purple-flowered spring or summer tare, and the purple-flowered wild or winter tare; the latter of which sort is by much the hardiest.

Numerous experiments in the culture of these different kinds of tares, were made by the Rev. Mr. Laurens, in order to ascertain their differences in hardiness, for which we refer to the Corrected Agricultural Survey of the County of Suffolk.

It is evident from the tall, close, hardy growth and succulent quality of the winter tare, that it must be a plant of much value to the farmer, as affording an abundant produce of green food for animals; and by being alternated with those of the grain kind, in ameliorating or preventing the exhaustion of the land that must otherwise take place. It has been suggested by the writer of the Agricultural Survey of the County of Middlesex, that it may be the means of enabling the arable farmer to support as much live-stock as the grazier, as while crops of this sort remain upon the ground, they afford larger supplies of the best kind of green food on the acre than the most rich and fertile grass lands; and they may be taken from the ground at so early a period in the summer season, as on the friable loamy soils to admit of a clean crop of turnips, &c. being obtained from the same land in the same year; and of those of the more heavy kinds being prepared and sown with wheat. And while they are capable of being raised with success on most sorts of soils and situations, they support and fatten cattle and sheep of different sizes and breeds in an expeditious manner. And further, they afford a good preparation for other sorts of green crops, and in that way keep up the succession of such sorts of food for the fattening of additional numbers of animals, and in that manner afford abundance of manure in situations where it could not otherwise be procured. On the

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the whole, he supposes, that by a judicious combination of this plant with those of turnips, clover, and sainfoin, the poor downs, sheep-walks, and other waste lands may be rendered from ten to thirty times more valuable than they are in their present state.

The tare in all its varieties is a plant which, in respect to soil, according to the author of the Present State of Husbandry, admits of considerable latitude, growing without difficulty or trouble on all the varieties, from that of the thin gravelly, to those of the deep and stiff clayey kinds, but flourishing in the most vigorous and perfect manner on those of the gravelly, loamy descriptions, that are not too moist or wet at particular seasons.

With regard to the preparation of the land for this sort of crop, there is less care necessary than for many other kinds of grassy sorts of crops, as it will succeed well where the soil has not been so much broken down, or reduced into fine mould; but it always grows in the most perfect and vigorous manner where a good degree of pulverization and fineness has been produced in the land by proper tillage. But in common, two or three ploughings, with occasional good harrowings in the intermediate times, may be fully sufficient for the purpose, at whatever season the crop is to be put into the ground.

As to the sowing of the seed of this crop, it has been observed, that as the seed of the spring tare does not succeed well when sown for the winter crop, nor that of the winter kind when put in for the summer product, care should be taken to keep the seeds of the two sorts as perfectly distinct as possible. And that as they are, from their being both of nearly the same colour and size, as well as their agreeing in other particulars, extremely liable to be mixed in the seed-shops, it may be the best practice for the cultivator to preserve his own seed, as by that means he may not only be certain of having the seed good in its quality, but of the right sorts, and, of course, may depend more fully on his crops. And it has been suggested by the writer of the Middlesex Report on Agriculture, that steeping the seed in dry seasons may be of utility in promoting the quick vegetation of the crop in many situations of land and peculiarities of season. With regard to the quantity of seed that should be employed, it should, of course, vary according to the nature of the soil, and the time as well as manner of sowing. But from two bushels to two and a half are the proportions most commonly recommended in the broad-cast method of sowing. But on poor sorts of land, where the seed is sown late, and the climate is backward, three bushels may not be too much. And it has been also observed by a late writer, that where the crops are either to be cut for foiling, or to be fed down by live-stock, the proportion of seed should be considerably increased, as not only a greater produce is thereby provided, but the growth of the crops rendered more quick and full. In the drill method of sowing, when at the distance of six inches, two bushels of seed will be quite sufficient; and where the distances are larger, still smaller proportions of seed will answer the purpose.

In regard to the periods and manner of sowing these sorts of crops, it is evident that the former must vary with the intentions of the cultivator; but the winter sowings should be performed some time between August and October; and in exposed situations and poor soils, more early than in those of the contrary description. As for the spring sowings of these crops, they may be executed from the beginning of March to the end of April, or even earlier, with success. In some places, as on the down lands in Suffex, they find great advantage from sowing spring tares in June with a light mix-

ture of rape or cole seed, as about a quart to the acre, on the same land, as furnishing a good and nutritious feed for weaned lambs in the autumnal season.

With regard to the mode of sowing crops of this nature, it is mostly that of the broad-cast, which should be performed as evenly as possible over the surface of the well-prepared land; the seeds being afterwards well covered in by proper harrowing, in order to prevent their being picked up by birds, and to ensure their perfect vegetation and growth. It has been suggested, however, that in rich clean soil, it is probable the row method would succeed well with this sort of crop, as is the practice in some of the southern districts of the island, according to a late practical writer. And with some it has been the custom to sow a little rye with their winter tare crops, and a small quantity of barley with those of the spring, on which, however, it has been well observed, that as plants of different sorts never succeed well together, it is probable that little advantage can be derived from the practice, especially as the tare is not a plant that stands much in need of protection in the early stages of its growth, and may be injured by too much shade and closeness. The former of these sorts of feed, and some others, may, however, be occasionally blended with it, and sown as a good green feed for some sorts of young animals, as already noticed.

It has been suggested in the first volume of the Farmer's Magazine, that the most productive method of sowing this crop, when intended for seed, is to mix them amongst beans when drilled, at the rate of one firlot of tares to one boll of beans.

It is further stated, however, as obvious, that when tares are intended for green food, there is no necessity for mixing them with beans. But that when such is the purpose, they require to be sown tolerably thick, so as the surface may be early covered; and if the ground is good, and recently dunged, an acre of them will afford as much keep for horses and cows, as can be gained from a full clover crop; at least the writer has found them fully as beneficial.

It has been found that crops of this sort are capable of being grown well after wheat or barley, but that they may be grown after almost any sort of crop where the land is in good heart, and properly prepared for the purpose.

In regard to the after-management of these sorts of crops, from their covering the land in a very complete manner, when they are sufficiently full, they do not require any great attention during their growth.

And in the process of making tare-crops into hay, more attention is found necessary than in those of most of the artificial grasses, as wet is more injurious to them, and they require more sun and air; but in other respects they demand the same cautious management, in order to prevent the foliage from being lost.

The most proper time for cutting for this purpose is, according to the author of the Synopsis of Husbandry, when the blossoms have declined, and the crops begin to fall flat on the ground. When well made, the hay is of the best and most nutritious quality or properties, being extremely useful in many intentions.

The writer of the Report of the State of Agriculture in Middlesex, states the produce as the result of experience, in having frequently weighed green tares, to be ten or twelve tons *per* acre, which is a large crop. And when made into hay, at about three tons the acre, which shews the vast disadvantage of making these crops into hay. The value of the produce, estimating it as if the whole were made into hay, being in that district from twelve to fifteen guineas the acre; and in situations where other sorts of hay sell at fifty shil-

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lings or three pounds, at from about seven pounds ten shillings to nine pounds the acre. And it is found that the spring tare-crops are lighter, and most liable to be injured by a dry season.

The produce in seed is likewise found to be considerable, being by some stated at from three to six sacks; but in other instances forty bushels or more have been obtained from the acre. It has been suggested, that this sort of seed is greedily devoured by pigeons, and that it may probably be used for poultry with advantage and profit, as being a very stimulant sort of food in the production of eggs.

In respect to the application of tare-crops, it has been well remarked by a late writer, that there can be little hesitation in pronouncing that of soiling them with horses or other sorts of live-stock on the farm, as the most advantageous and beneficial method of any which can be adopted for them.

It has, however, been advised by the author of the Agricultural Survey of the above district of Middlesex, that the farmer's stock should be wholly supported on them, from the time they begin to blow till the blossoms begin to fall off, and the formation of pods to take place. And, on account of the risk from wet, he advises that all the stock of a farm should be soiled on them green, as it will have the good effect of taking the stock off the grass land long enough to allow of its being mown for hay; and by this means the meadow-hay be much increased in quantity, and there will not be so much occasion for pasture, the tares abundantly supplying its place. And that besides, at the time the cattle return from green tares, the grass land in the mean time having been mown, may be ready to receive them. The same able writer remarks, in addition, that as it would be wasteful in the extreme to turn live-stock into a field of tares, as their treading and lying down would do great mischief to the crop, even by feeding it in small patches hurdled off; the most advisable method would be to mow the tares of the first half acre, and to carry the produce into the stables, cow-houses, and fold-yards, or on poor land, to be consumed by stock; then to hurdle the growing tares from such cleared ground, into which put the stock, and feed them all with the tares, given to them in racks, removing the hurdles and the racks forward daily to the edge of the growing tares; which will manure the land uniformly, and deposit all the urine in the soil. But the writer of the Corrected Gloucester Report on Agriculture, has stated another method of proceeding, where sheep are the sort of stock employed, which seems by no means ineligible, *viz.* to feed them through rack hurdles, which are made the same as the common five-railed ones, only leaving the middle rail out, and nailing upright pieces across, at proper distances, to admit the sheep to put their heads through. A swathe of vetches being mown in the direction you wish to plough the land, a sufficient number of these hurdles, allowing one to five sheep, are set up close to it: at noon, the shepherd mows the swathe and throws it to the hurdles, and the same at night: next morning, a swathe being first mown, the hurdles are again set, thus moving them once in the twenty-four hours. By this trifling additional trouble, the vetches are, it is said, eaten clean off, and the land equally benefited.

The writer of the Hertfordshire Corrected Agricultural Report remarks, that in the heavy land districts, he has found tares very generally cultivated for soiling the teams; a husbandry, he thinks, that cannot be too much commended. And he contends farther, that it appears by the writings of Ellis, that this branch of agriculture was common in this county above sixty years ago, before it was at all practised in many other counties, and he was glad to find it holds its place steadily in the management of the present period. It

is noticed, that Mr. Leach, of the same district, manures for tares, and that they are mown early, and then three earths are given to the land, when he gets good turnips after them. And that they are universal about Rickmanfworth and Watford, many being fed off by sheep.

And the same writer says, in his Agricultural Survey of Norfolk, that the culture of this plant has increased very considerably in that district: within his memory they are multiplied at least tenfold. And that Mr. Overman there begins sowing winter tares about Michaelmas, once more before Christmas, and sometimes twice or thrice more, with spring tares for a succession. That after mowing, he does not plough the land, but runs sheep over it till the wheat-sowing. But that the cultivator who has made by far the greatest exertions in this husbandry that he ever met with, is Mr. Purdis, of Eggmore, who has 300 acres every year, feeding no more than is necessary to supply himself: they are fed by his sheep; used in soiling his numerous horses; and immense quantities made into hay.

It is suggested, as the remark of Mr. Blithe, that the sowing tares for summer-feeding sheep, is an absolutely new improvement in the husbandry of West Norfolk, and that he thinks it a very great and important one.

And in both the counties of Gloucester and Worcester, it is the practice to sow these crops as pasturage or feed for horses, and eat or get them off early enough to allow of turnips being sown the same season. But, as in the wet seasons, when the tare-crops are large, the steins are apt to become rotten upon the ground, and in this condition such food often proves prejudicial to the horses; in all such cases, it will be imprudent to cut or eat them any longer for the purpose of soiling in these ways.

It is noticed in the twenty-second volume of the Annals of Agriculture, that in the county of Sussex, these sorts of crops are of such use and importance, that not one-tenth of the stock could be maintained without them; horses, cows, sheep, and hogs, all feed upon them, the hogs are soiled upon them without any other food. This plant maintains more stock than any other plant whatsoever. Upon one acre, Mr. Davis, of this district, can maintain four horses in much better condition than upon five acres of grass. Upon eight acres he has kept twelve horses and five cows for three months without any other food. No artificial food whatever is equal to this excellent plant in his opinion.

They here find this crop to be a hearty and most nourishing food for all sorts of cattle. Cows give more butter when fed with this plant than with any other food whatsoever. And by having one crop of vetches succeeding another, Mr. Halstead, in the same county, insures a crop the whole summer of the best food that can be given to cattle; after this, he sows turnips, and then wheat.

In many of the southern counties, as Cornwall, Devon, Kent, and some others, the culture of this sort of crop might be greatly extended with vast advantage, especially if it were grown with the view of soiling different kinds of live-stock, to which purpose it is by far the best suited. Also, in many cases, as a highly valuable early sort of green spring feed for many kinds of young animals; the climates and soils being mild, and particularly favourable for their very early production and abundant growth, when sown at the most proper season.

It is remarked also, that they have on the South Downs an admirable practice in their course of crops, which cannot be too much commended, that of substituting a double crop of tares, instead of a fallow for wheat. Let the improving cultivator give his attention to this practice, for it is worth, in the opinion of the writer, a journey of five hundred miles.

They

They sow forward winter tares, which are fed off late in the spring with ewes and lambs: they then plough and sow summer tares and rape, two bushels and a half of tares, and half a gallon of rape; and this they feed off with their lambs in time to plough once for wheat. A variation is for mowing, that of sowing tares only in succession, even so late as the end of June for soiling. See SOILING.

**TARE and Tret**, in *Commerce*, any defect, waste, or diminution in the weight, the quantity, or the quality of goods.

The feller is usually to account to the buyer for the *tare* and *tret*.

Tare is more particularly used for an abatement, or deduction in the price of a commodity, on account of the weight of chests, casks, bags, &c. in which goods are put up, and whose weight may be known separately from that of the goods: and which being subtracted from the gross weight, or that of the cask, &c. and goods together, gives the weight of the goods alone, or the nett or neat weight. But if the tare is not known separately, and an allowance made for it at so much *per* hundred weight, or hundred yards, &c. then the deduction of the tare is by the rule of three.

Before the tare is taken off, the allowance called the *draft* or draught is subtracted from the original or gross weight of goods.

Tare is distinguished by a variety of denominations; thus: *Real* tare, or *open* tare, is the actual weight of the package; *customary* tare is an established allowance for the weight of the package; *computed* tare is an estimated allowance agreed upon at the time; *average* tare is when a few packages only among several are weighed, their mean or average taken, and the rest tared accordingly; *super* tare is an additional allowance or second tare, when the commodity or package exceeds a certain weight.

When tare is deducted, the remainder is called the *nett* weight; but if tret be allowed, it is called the *subtle* weight.

*Tret* is a deduction of 4 lbs. from every 104 lbs. of the *subtle* weight.

There was another allowance that was formerly made for dust or sand, or for the waste or wear of the commodity on foreign articles paid by the pound avoirdupois; but this is now nearly discontinued by merchants, or rather allowed in the price. It is wholly abolished at the East Indian warehouses in London, and neither tret nor draft is allowed at the custom-house.

The allowance called *tret* is calculated in the same way with tare. *Ex. 1.*—At 7 lbs. tare, or tret, to 112 lbs. gross, what is the tare, and also the nett weight, when 746 lbs. gross was received? say, as 112 lbs. to 7 lbs. so is 746 lbs. to the tare sought, which subtracted from 746 lbs. the remainder is the nett weight.

*Ex. 2.*—At 5 lbs. tret to 112 lbs. gross, what gross weight must be received, when 84 lbs. nett was paid for: and how much is allowed? subtract 5 from 112, then say, as 107, the remainder to 112, so is 84 to the gross weight sought; the difference of which and 84 is the allowance. Or thus: as 107 to 5, so is 84 to the allowance sought, which, added to 84, gives the gross weight sought. Thus from the gross weight, nett weight, and allowance, or any two of these in one case given, with any one of them in another case, we find the other two in that other case.

There are sometimes two allowances deducted out of the same quantity; first tare, and then tret: after the tare is deducted, the remainder is called particularly *subtle* or

*subtle* weight, out of which the tret is deducted, and the last remainder is called *nett* weight.

*Ex. 3.*—Tare being allowed at 4 to 112, and tret at 5 to 112, what is the nett weight in 87 lbs. gross? say, as 112 to 108 (= 112 - 4), so is 87 lbs. to the subtle; then as 112 to 107 (= 112 - 5), so is the subtle to the nett. And if you multiply 108, 107, and 87 continually, and also 112 by 112, and divide that product by this, the quotient is the nett weight sought. Malcolm's Ar. p. 564.

The tare is very different in different merchandizes: in some there is none at all allowed. It is a thing much more regarded in Holland than in England, or elsewhere: a modern author, M. Ricard, treating of the commerce of Amsterdam, observes, that the tares are one of the most considerable articles with which a merchant is to be acquainted, if he would trade with security.

Sometimes the tare is, as it were, regulated by custom; but generally, to avoid all dispute, the buyer and feller make a particular agreement about it.

For a comprehensive and accurate table of the custom-house and commercial allowances for various kinds of goods, we refer to the first volume of Dr. Kelly's "Cambist," our limits not allowing the insertion of it, though the liberality of the author would not object to our thus availing ourselves of his labours.

**TAREEKAB**, in *Geography*, a town of Candahar, on the Cameh; 23 miles E.S.E. of Cabul.

**TAREF**, a town of Arabia, in the province of Hedsjas; 25 miles N.E. of Medina.

**TAREIBOIA**, in *Zoology*, the name of a species of serpent found in America, and called also *cacaboia*; though, according to some authors, the tareiboia and cacaboia are two different species.

They are both of the amphibious kind, and live in lakes and waters, as well as on land; but they are not very poisonous. They are small snakes, and all over black; when offended they will bite, but the wound is curable. Authors have written differently of those serpents, some making the latter very different from the former, and of a yellow colour. Ray.

**TAREINSKA**, in *Geography*, a harbour of Kamtschatka, in Avatcha bay; 10 miles S. of St. Peter and St. Paul.

**TAREIOU**, a town of Brasil, in the government of St. Francisco; 160 miles S.W. of Fernambuco.

**TAREIRA**, in *Ichthyology*, the name of a fish caught in the American seas, and eaten, but of no fine flavour. It is of an oblong and thick body, gradually tapering toward the tail; its head resembles that of a snake, and is raised into two tubercles over the eyes; its eyes are yellow, with a black pupil; its nose pointed, and its mouth large and yellow within; it has extremely sharp teeth in both its jaws, and on its tongue; it has eight fins, the tail being accounted one, and this is forked; but this, as well as the rest, is of the consistence of a poppy-leaf, tender, thin, and soft, and sustained by soft rays; its scales are so nicely laid on one another, that it seems smooth to the touch; its belly is white, and its back and sides are variegated with longitudinal green and yellow lines. Marcgrave.

**TAREIRI**, in *Geography*, a river of Brasil, which runs into the Atlantic, S. lat. 6°. W. long. 34° 43'

**TAREKA**, in *Hindoo Mythology*, is the name of a fort of demon slain by Rama, in his warfare described in the Ramayana.

**TAREM**, in *Geography*, a city of Persia, in the province of Laristan, which is a meanly built place, situated in a

plain on the banks of a salt river. It consists of a mud fort, surrounded on all sides by wretched huts, formed of the branches of a date-tree, which grows in great abundance on the plain. It is the residence of many respectable merchants, who trade to Mascat, Gombroon, and Shirauz; and contains about 12,000 inhabitants; 30 miles N.N.E. of Lar, which is situated in N. lat.  $27^{\circ} 30'$ . E. long.  $52^{\circ} 45'$ .

**TAREMDSONG**, or **TARENGASONG**, a town of Tibet; 160 miles S.S.E. of Lassa. N. lat.  $27^{\circ} 40'$ . E. long.  $92^{\circ} 50'$ .

**TARENT**, a river of England, which runs into the Stour, in the county of Dorset, 3 miles S.E. of Blandford.

**TARENT**, an island of the Persian gulf, close to the shore, and immediately opposite to Ketif; although not so large, is a finer island than Bahrein. It is about seven miles long, and about as much in breadth, well supplied with good fresh water, and embellished with many delightful gardens, which produce fruits of various kinds in abundance.

**TARENTEISE**, *County of*, a province of Savoy, bounded north by the lordship of Faucigny, east by the duchy of Aosta, south by the county of Maurienne, and west by the duchy of Savoy; erected into a bishopric about the fifth century, and an archbishopric in the eighth. The kings of Burgundy erected it into a county; and towards the end of the eleventh century, Humbert II., earl of Maurienne and Savoy, became master of it, and his descendants held it afterwards. The soil is barren, and the aspect of the country, abounding with mountains and precipices, unpleasant, with little good land. The Isere crosses it from east to west. In its union with France, it formed part of the department of Mont Blanc.

**TARENTO**, a city of Naples, and province of Otranto, the see of an archbishop, situated on a small peninsula, which projects into a bay of the Mediterranean, to which it gives name. *Tarentum* (which see) was anciently the capital of a celebrated republic; but after undergoing many revolutions, it was destroyed by the Saracens or Hungarians: soon afterwards it was rebuilt in a new situation. After the total expulsion of the Greeks, duke Robert, the Norman, created his son, Bohemund, prince of Tarento; but his issue failing, it was bestowed on Henry, son of king Roger, and afterwards on William, a bastard of that family. It was wrested from him, on account of his illegitimacy, and conferred on Manfred of Swabia, who long bore the title of prince of Tarento. Its next transfer was made by Charles II. to his son Philip, titular emperor of Constantinople, by whose daughter it was conveyed to the house of Baux. Upon the failure of this family, it was obtained by Raymond Orsini, a younger son of the family of Nola. King Ladislaus, by marrying the widow of Raymond, became master of Tarento. Queen Joan II. gave it to her husband, the earl of La Marche; and he sold it to John Anthony Orsino Balzo, the right owner. When this prince died without issue, Tarento escheated to the crown. The inhabitants, neglecting the culture of the soil, directed their whole attention to fishing. Their number is estimated at 18,000. Its harbour, which was once excellent, is now so shallow as to admit only fishing boats. It is defended by a fort. The bay of Tarento is remarkable for springs of fresh water at the bottom, which, as it is said, may be taken up in a calin from the surface; 60 miles W.N.W. of Otranto. N. lat.  $40^{\circ} 45'$ . E. long.  $17^{\circ} 10'$ .

**TARENTUM**, in *Ancient Geography*, a town of Italy, in Magna Græcia, upon a small promontory of the Messapia. Tarentum was a very ancient city: some have ascribed its origin to the Cretans, before the Trojan war. In the 21st

Olympiad, a powerful body of emigrants arrived under Phalanthus from Laconia, that it seemed to be refounded. Here they settled upon an aristocratical plan, enlarged the fortifications of the city, and transformed it into a near resemblance of Sparta. Places were called by new names; and as most of the nobles had perished in a war with the Japyges, democracy was introduced. The favourable situation of this city, when it was first founded, contributed to its rapid prosperity. Placed in the centre of three seas, it obtained the whole commerce of the Adriatic sea, of the Grecian or Ionian sea, and of that portion of the Mediterranean called the Tyrrhenian sea. The adjacent country was fertile in grain and fruit; the pastures were excellent; the flocks afforded a very fine wool. It is no wonder, then, that the city should become rich, and that riches should be succeeded by luxury. Philosophy was not neglected at Tarentum; and that of Pythagoras gained the preference. The arts were also diligently cultivated. Strabo mentions the gymnasium of this city with high commendation, and the bronze colossus of Jupiter, which was scarcely inferior to that of Rhodes. Fabius Maximus found here abundance of pictures and statues, which served to adorn his triumph. With the wealth of Tarentum, its power also rose above that of all the colonies of Magna Græcia: its land forces were estimated at 32,000 foot and 3000 horse, in constant pay; and thirteen considerable cities acknowledged its dominion. At sea, their fleets rode triumphant and unrivalled. The most brilliant epoch of their history was that of the government of Archytas, whose profound learning as a philosopher, and skill as a mechanic, was no impediment to his political talents and exertions. His virtues also commanded respect. He frequently led the Tarentines to battle, and always returned after success. With Archytas, however, terminated the prosperity of Tarentum. At length this city partook of the horrors of those wars which desolated the southern part of Italy. The inhabitants not only exposed themselves to the Roman arms by some outrages committed against their ambassadors, but in the year 541 of Rome, Annibal having taken possession of Tarentum, the Romans sent against them a body of troops under Fabius Maximus, who retook it, and gained possession of its ample stores of wealth. In the year 664 or 665, it was made municipal; and in process of time, it became a very pleasant city. Whilst Totila was ravaging Italy in the year of Christ 546, the Greeks took possession of Tarentum, but suddenly abandoned it at the approach of a detachment of troops belonging to the king of the Goths; which event occurred in the year 548. In 552 the troops of Narfes retook it; but it was doomed to pass under the dominion of Ronwald I., duke of Beneventum, in the year 668. On the decline of the Lombard power, the Grecian emperors regained possession of this country, and retained it till Robert Guiscard drove them for ever out of Italy. For its subsequent history, &c. see **TARENTO**.

**TAREYEN**, in *Geography*, a town on the west coast of the island of Celebes. N. lat.  $1^{\circ} 13'$ . E. long.  $119^{\circ} 12'$ .

**TAREYRAS**, a town of Brasil, in the government of Goyas; 75 miles E.N.E. of Villa Boa.

**TAREZA**, a river of Hungary, which runs into the Samos, 20 miles S.W. of Tokay.

**TARF**, a river of Tunis, which runs into the Mediterranean, 3 miles S. of Maharefs.

**TARFE**, a town of Egypt; 7 miles W. of Cairo.

**TARFOKIRAT**, a town of the kingdom of Fez, on the coast of the Mediterranean; 22 miles W. of Melilla.

**TARFOWA**, a town of Africa, in Tunis, supposed to be

be the ancient Taphrura or Taparura; 24 miles W. of Thainee.

TARFVALA, a town of Sweden, in the province of Tavastland; 70 miles N.N.E. of Jamio.

TARGA, a sea-port town of Fez, near which is an oyster fishery; 90 miles S.E. of Tangiers.

TARGA. See TIRGA.

TARGAR, a name given by some of the chemical writers to oil of juniper.

TARGET, a shield; thus called from the Latin, *tergum*, back, because originally made of leather, wrought out of the back of an ox's hide.

TARGET is also the name of a mark for the artillery to fire at in their practice.

TARGET, in *Geography*, a town of France, in the department of the Allier; 2 miles S.E. of Montmarault.

TARGIONI, TOZZETTI, GIOVANNI, in *Biography*, an eminent Italian physician, was born at Florence in 1712, and took his degree of M.D. at Pisa, where he had studied and acquired singular reputation. Upon his return to Florence, he applied to the study of botany under the celebrated Micheli, who, at his death, bequeathed to him his library, herbarium, and MSS., and also the succession to his directorship of the botanical garden. He was likewise nominated professor of botany in the Florentine college by the grand duke; and admitted to the two academies of the Apatisti and Della Crusca. In conjunction with Cocchi, he engaged in making a catalogue of the library of Magliabecchi, which he had bequeathed to the public; and in recompense of his labour, the grand duke appointed him librarian. His various occupations, in connection with his practice, rendered it necessary for him to resign the office of director of the botanical garden in 1749. The mind of Targioni, however, was so active, that not content with his literary and professional employments at home, he made several scientific excursions, the result of which he published in his "Relazioni d'alcuni Viaggi fatti in diverse parte della Toscana per offerver le Produzioni naturali, e gli antichi Monumenti d'esse," Firenz. t. 1. 1751, 8vo. As a physician, he also published several pieces, and among these were "Directions for the Recovery of drowned Persons." He also promoted inoculation for the small-pox; and directed his attention to the treatment of epidemics, the draining of marshes, the prevention of the inundations of the Arno, and the examination of vegetables to be substituted for bread in a time of scarcity. Having taken leave of literary labours by a work on the progress of the physical sciences in Tuscany, comprehended in four volumes, he restricted himself to medical practice from the year 1770 to 1780. At length, in January 1782, being in his 71st year, his life terminated by a gradual decay. Haller. Gen. Biog.

TARGIONIA, in *Botany*, was so named by Micheli, in honour of his friend and fellow-labourer in the natural history of Italy and other parts of the world, Dr. Cyprian Targioni, of Florence, whose valuable museum he highly celebrates. There have been several persons of this name, distinguished at Florence, in medicine and natural history. John Targioni, who took the surname of Tozzetti for an estate, was professor of botany there, and died in 1782, aged 70. He published *Travels in Tuscany*, as well as several other works relating to natural science, and purchased the museum and library of MICHELI. (See that article.)—Mich. Nov. Gen. 3. t. 3. Linn. Gen. 565. Schreb. 764. Mart. Mill. Dict. v. 4. Sprengel in Stockholm Transf. for 1802. 85. t. 4: also in *Bullet. des Sciences*, 27. t. 2. f. 2. Juss. 8. Lamarck Illustr. t. 877.—Clafs and order, *Cryptogamia Hepatica*. Nat. Ord. *Alga*, Linn. *Hepatica*, Juss.

Gen. Ch. *Cal.*? Perianth a continued membrane, finely reticulated, enveloping the pistil, at length bursting. *Stam.*? Anthers numerous, roundish, sessile, scattered over the inside of the perianth. *Pist.* Germen oval, nearly sessile, accompanied at the base by the rudiments of others, with abortive styles; style terminal, awl-shaped, tubular, deciduous; stigma concave. *Peric.* Capsule sessile, nearly globose, of two hemispherical valves, bursting vertically, and one cell. *Seeds* very numerous, minute, roundish, connected by five threads into a dense globular mass.

Ess. Ch. Capsule globose, of two concave valves, and one cell. *Seeds* numerous, combined by fibres into a globe.

1. *T. hypophylla*. Dotted Targionia. Linn. Sp. Pl. 1603. Hudf. 519. Engl. Bot. t. 287. Dickf. Dr. Pl. 20. (*T. minima et vulgaris*; Mich. n. 1. Lichen petræus minimus, fructu orobi; Dill. Musc. 532. t. 78. f. 9. L. alter acaulis ἐποβυλλοκαρπος; Column. Ecphr. part 1. 333. t. 331.)—Very common in heathy rather moist places, among mosses, on old walls and rocks, in most parts of Italy. It is said also to have been found in Devonshire, and in Scotland. We have had living plants from a bank near Nayland in Suffolk, where the *Targionia* was discovered by the Rev. Mr. Kirby. The *fronds* are oblong, inversely heart-shaped, three quarters of an inch in length, growing nearly horizontally, in dense imbricated patches, attached by copious fine fibrous roots; their upper surface dark green, marked with a slight longitudinal furrow, and besprinkled with pale prominent points; the under side black, becoming visible when, by drought, the margins are curled in. The parts of the *flower* we have not seen. The *fruit* stands at the back of the frond, a little below the end, and looks like the seed of a vetch, being nearly globular, of a very dark brown, almost black; separating when ripe into two hemispherical valves, enclosing a globular mass of black powdery seeds, connected by fibres. The habit of the plant is exactly like that of a MARCHANTIA, (see that article,) but the generic character differs essentially, by the fruit alone, from that genus, as well as from JUNGERMANNIA, of which latter Hedwig suspected it to be a species. We rely on the observations of Sprengel for the structure of the flower, though without any solid conviction that the *anthers* are what he describes. The female parts of fructification resemble those of true MUSCI, (see that article,) but the *capsule* is totally different. This part is called *calyx* in the *English Botany*, from a supposed analogy to *Sphaerocarpus*, which we now believe to have little foundation. Whether there be any membrane extended from the base of the style over the germen, like the *calyptra* of mosses, does not appear from Sprengel's description, but it is highly probable; though as he expressly says the style itself is deciduous, that circumstance would still afford a material distinction.

TARGON, in *Geography*, a town of France, in the department of the Gironde; 6 miles N.E. of Cadillac.

TARGOWISKA, a town of Poland, in Volhynia; 9 miles S. of Lucko.

TARGUM, in the *Sacred Literature*, a name which the Jews give to their Chaldee glosses and paraphrases on the Scripture. See PARAPHRASE.

These Chaldee paraphrases, which were translations of the scriptures of the Old Testament, from the Hebrew text into the language of the Chaldeans, were called *Targums*: for the word *targum* signifies in Chaldee an interpretation or version of one language into another, and may properly be applied to any such version or translation; but it is most commonly by the Jews appropriated to these Chaldee paraphrases by way of eminence.

As the Jews, during their long captivity in Babylon, had forgot their ancient language, the Hebrew; and now understood nothing but the language of their masters, the Chaldeans; there was a necessity of explaining the prophets in that language; and to this necessity is owing the first beginning of the Chaldee paraphrase.

To make the sense of the text understood, each doctor made a paraphrase of some part of it in the vulgar tongue; and as these several interpretations, in time, became very voluminous, certain rabbins undertook to collect them together; and this collection they called *The Targum*.

The Jewish doctors do not agree about the antiquity of the Targum; for the more modern Jews having blended their own comments with those of the ancients, no certain age or era can be fixed for the whole work.

It is commonly believed, that R. Jonathan, who lived under the reign of Herod the Great, made the first Chaldee version of the prophets; and with this version mixed the interpretations borrowed from tradition. Onkelos, it is certain, translated the Pentateuch almost word for word; and without any paraphrase; and another version of the Pentateuch is ascribed to Jonathan, but that without much certainty.

Dr. Prideaux thinks, that the version or Targum of Onkelos is the most ancient of all that are now extant: and the principal reason of his adopting this opinion is, that the style in which it is written approaches nearer to the style of that part of Daniel and Ezra, which is written in the Chaldee language, and which may be considered as a standard of its purity, more than any other. This Targum has been held in higher esteem among the Jews than all the other Targums, and being set to the same musical notes with the Hebrew text, it is thereby made capable of being read in the same tone in their public assemblies. The next to this in the purity of its style, is the Targum of R. Jonathan Ben Uzziel on the prophets; that is, on Joshua, Judges, the two books of Samuel, the two books of Kings, Isaiah, Jeremiah, Ezekiel, and the twelve minor prophets. The Targum of Onkelos is a strict version, rendering the Hebrew word for word; whereas Jonathan takes the liberty of a paraphrase, by enlargements and additions to the text. The third Targum, or that on the law, ascribed to Jonathan, is not his, because the style of it is wholly different from that of his true Targum on the prophets, and several things are mentioned in it, which had no being, or at least no name, till after Jonathan's time. The fourth Targum is on the law, written by an unknown author, and at an unknown period. It is called the *Jerusalem Targum*, probably because it was written in the Jerusalem dialect, which was spoken by the Jews after their return from Babylon, and which contains a mixture of Hebrew words with the Chaldee. This Jerusalem Targum is not a continued paraphrase, as all the rest are, but confined to select passages, as the author seems to have thought the text most wanted an explication. In many places it is taken word for word from the Targum, said to be Jonathan's on the law: and contains several things, which are delivered in the same words in the New Testament by Christ and his apostles. Dr. Prideaux accounts for this circumstance, by supposing that these were sayings and phraseologies, which had obtained among the Jews in the time of our Saviour, and continued among them long after: and hence Christ and his apostles, and afterward the author of this Targum, derived them from the same source. The fifth Targum, which is that on the Megilloth, *i. e.* Ruth, Esther, Ecclesiastes, Solomon's Song, and Jeremiah's Lamentations; the sixth, which is the second Targum on Esther; and the seventh,

which is that on Job, the Psalms, and the Proverbs, are all written in the most corrupt Chaldee of the Jerusalem dialect. Of the two former, no author is named; but the author of the third is said to be Joseph the one-eyed, but who he was, or when he lived, we are not told; but on the Megilloth, which mentions the Mischna and the Talmud with the explication, must have been written after the Babylonish Talmud, or the year of Christ 500. The eighth and last of these Targums, is that on the two books of Chronicles; published by Beckius at Augsburg in Germany, that on the first book in 1680, and that on the second in 1683. On Ezra, Nehemiah, and Daniel, there is no Targum.

That the Targum of Onkelos on the law, and that of Jonathan on the prophets, are as ancient as our Saviour's time, if not more ancient, is the general opinion of both Jews and Christians. As to all the other Targums besides these two, they are certainly of a much later date: the style of every one of them is more barbarous and impure than that of the Jerusalem Talmud, and they must, therefore, have been written after the composition of that work, *i. e.* after the beginning of the fourth century after Christ; and if the Talmudic fables, with which they abound, were taken out of the Babylonish Talmud, this will bring their date still lower, and prove them to have been written after that Talmud, or after the beginning of the sixth century after Christ.

The Targums of Onkelos and Jonathan are in such great esteem among the Jews, that they hold them to be of the same authority with the original sacred text, and for the support of this opinion, they feign them to be derived from the same fountain. The Chaldee paraphrase of Onkelos, they say, was delivered in the same manner with the real law, when God gave the written law unto Moses at Mount Sinai; and when by his holy Spirit he dictated to the prophets the prophetic books, he delivered severally to them upon each book the Targum of Jonathan at the same time. These were delivered by faithful hands, the first from Moses, and the other from the prophets, till they came down to Onkelos and Jonathan, who only put them into writing.

Agreeably to the high opinion that was entertained of them, they were read every Sabbath-day in their synagogues, in the same manner as the original sacred word itself, of which they were versions; and this use of them was continued to late times. Whether the Targums of Onkelos and Jonathan were received for this use so early as our Saviour's time is not certain; however, it seems that these, or some others, were used for the instruction of the people, and were read among them in private as well as in public. Agreeably to this purpose, they had some of their bibles written out in Hebrew and Chaldee together; that is, each verse first in Hebrew, and then in Chaldee; and thus from verse to verse through the whole volume. In these bibles, the Targum of Onkelos was the Chaldee version for the law; and that of Jonathan for the prophets; and for the Hagiographa, the other Targums that were written on them. One of these bibles, thus written, Buxtorf tells us he had seen at Strasburg: and bishop Walton acquaints us, that he had the perusal of two others of the same sort, one in the public library of the church of Westminster, and the other in the private study of Mr. Thomas Gataker. The other Targums are all of a much later date than those of Onkelos and Jonathan, and of far less authority: however, bishop Walton has introduced most of them into his Polyglot. The Targums of Onkelos and Jonathan are of great use for the better understanding not only of the Old Testament, on which they are written, but also of the New. As to the

the Old Testament, they serve to vindicate the genuineness of the present Hebrew text, by proving it to be the same that was in use when these Targums were made, contrary to the opinion of those who think the Jews corrupted it after our Saviour's time. They help to explain many words and phrases in the Hebrew original, and they hand down to us many of the ancient customs of the Jews. And some of these, with the phraseologies, idioms, and peculiar forms of speech, which we find in them, do in many instances help as much for the better illustration and better understanding of the New Testament as of the Old: the Jerusalem Chaldee dialect, in which they are written, being the vulgar language of the Jews in our Saviour's time. They also very much serve the Christian cause against the Jews by interpreting many of the prophecies of the Messiah in the Old Testament, in the same manner as the Christians do. Many instances are produced to this purpose by Dr. Prideaux in his *Connect. of the Hist. of the Old and New Test.* vol. iv. p. 777, &c.

These Targums are published to the best advantage in the second edition of the great Hebrew bible set forth at Basil by Buxtorf the father, anno 1610, for he has rectified the Chaldee text, and reformed the vowel pointings in it: the Targums having at first been written without vowel points, which were afterwards added very erroneously by some Jews.

TARHONA, in *Geography*, a town of Africa, in Tripoli; 25 miles S.W. of Lebida.

TARI, or TORN, a river of Africa, which runs through the kingdom of Popo into the sea.

TARI, in *Commerce*. See TARO.

TARICHIÆ, in *Ancient Geography*, islands situated on the coast of Africa, in the Mediterranean sea, between Leptis and Thapsus, mentioned by Strabo.

TARIDEGO, in *Geography*, a town of Africa, on the river St. Domingo. N. lat.  $12^{\circ} 10'$ . W. long.  $13^{\circ} 56'$ .

TARIENTO, a town of Italy, in Friuli; 8 miles N. of Udina.

TARIER of Buffon, in *Ornithology*. See MOTACILLA *Rubetra*.

TARIERA, in *Ichthyology*, the name of a river-fish caught in many parts of America.

It is an oblong fish, with a straight back, and a belly somewhat hanging down; its under jaw is longer than its upper, and its teeth are extremely sharp: among these are two longer than the rest in the middle of the under jaw, and four such in the upper; its scales are large, its back brown, and its belly and sides whitish. It is a well-tasted fish, but full of bones. Marcgrave.

TARIF, or TARIFF, *Book of Rates*; a table or catalogue, drawn usually in alphabetical order, containing the names of several kinds of merchandize, with the duties or customs to be paid for the same, as settled by authority, and agreed on between the several princes and states, that hold commerce together.

TARIFFA, in *Geography*, a sea-port town of Spain, in the province of Seville, situated on a bay to which it gives name, on the north side of the Straits of Gibraltar, fortified with old walls and towers, with a castle, in which the governor resides. By the Romans it was called "Julia Traducta," and "Julia Joza." The present name is from the Moors; 27 miles S.S.E. of Medina Sidonia. N. lat.  $36^{\circ} 3'$ . W. long.  $5^{\circ} 41'$ .

TARIFILON, in *Botany*, a name by which Avicenna, and some other authors, have called the *trifolium bituminosum*, or stinking trefoil.

TARIJA, in *Geography*, a jurisdiction of South Ame-

rica, in Peru, but placed under the viceroyalty of Buenos Ayres. This is represented a charming and fertile country, with a serene sky and a fine temperature of air, producing wheat, maize, and all other things that are essential to the support of man; together with the tree, which produces the herb of Paraguay, the cocoa, the vine, and flax, which is cultivated merely for the sake of its seed. In the abundance of pastures are fed a vast number of cattle and sheep. The annual transports of black cattle alone are computed at little less than 10,000 head, which are valued at from eight to ten piastres each. The hides tanned and prepared form sole-leather for the inhabitants of La Plata, Potosi, &c. The demands for Spanish and colonial merchandize annually exceed 60,000 piastres; the returns for which are made in productions of the province. St. Bernardo de Tarija is the chief town. Chicas and Tarija form one government.

TARIJA, a river of South America, which runs into the Vermejo, in the province of Tucuman.

TARIJA. See St. Bernardo de Tarija.

TARIN, in *Ornithology*, a name given by the French, and from them by many others, to the citrinella; a bird common in Italy, and kept in cages for its beauty and fine notes. See FRINGILLA.

TARINGASONG, in *Geography*, a town of Thibet; 17 miles S.S.E. of Lassa. N. lat.  $28^{\circ} 6'$ . E. long.  $93^{\circ}$ .

TARINGTING, in *Ornithology*, a name given by the people of the Philippine islands, to a species of lapwing, which is common on the sea-shores, and runs remarkably swift.

TARINURAK, in *Geography*, a river of Russia, which runs into the Lena, N. lat.  $61^{\circ}$ . E. long.  $124^{\circ} 14'$ .

TARISKERI, a town of the island of Metelin, on the N. coast; 12 miles E. of Cape Sigri.

TARITH, one of the many names given by chemists to mercury.

TARITO, in *Geography*, a town of Thibet; 33 miles S.E. of Tchontori.

TARKA, a mountain of Transylvania; 28 miles N.N.E. of Udvarhely.

TARKI, a town of Hungary; 15 miles N.N.W. of Topoltzen.

TARKI, or *Tarku*, a town of Asia, in Daghestan, capital of the district of Schamgul, seated in N. lat.  $42^{\circ} 50'$ , and supposed to contain 10,000 inhabitants, stands on the Caspian shore, in a narrow glen, through which run many streams of salt-water.

TARKIRA-HOUTCHIN, a post of Chinese Tartary, in the country of the Monguls. N. lat.  $44^{\circ} 34'$ . E. long.  $113^{\circ} 48'$ .

TARKO, a town of Hungary, 6 miles E.S.E. of Szeben.

TARKSHA, a name of the fabulous bird Garuda, on which, in the mythology of the Hindoos, their god Vishnu rides. This vehicle, or vahan, in the Sanscrit tongue, is represented as half man half eagle; and offers an argument for the identity of the Hindoo deity, and the Jupiter of the Greeks. Another name of this bird is *Superna*; which see. See also VAHAN.

TARMA, in *Geography*, a jurisdiction of South America, in Peru, situated to the north of Atun Xauxa, about 90 miles from Lima, to which diocese it belongs, and is one of the most extensive in this part of Peru. The climate is temperate, and the soil fertile, except towards the mountains, where it is cold, and the land is chiefly applied to feeding of cattle; and many mines of silver are found. Tarma, the capital,

capital, is 85 miles E. of Lima. S. lat. 11°. W. long. 75° 50'.

**TARMONBARRY BRIDGE**, a village of the county of Roscommon, Ireland, at which there is a bridge over the Shannon. The royal canal, if it should ever be completed, is to join the Shannon near this place. It is 4 miles N.W. from Longford, and above 60 from Dublin.

**TARMON-HILL**, a mountain at the southern extremity of the peninsula, called *The Mullet*, being a detached part of the county of Mayo, Ireland.

**TARN**, a river of France, which rises in the mountains of Lozere, passes by Florac, Ispanhac, St. Enimie, Compeyre, Milhau, St. Rome, Alby, L'Isle, Rabastens, Ville-mur, Montauban, &c. and joins the Garonne, near Moissac, in the department of the Lot.

**TARN**, a department of France, being one of the nine departments of the southern region, and formerly a portion of Upper Languedoc, in N. lat. 43° 40', bounded on the N. and N.E. by the department of the Aveyron, on the S.E. by that of Herault, on the S. by that of the Aude, and on the W. by the departments of the Upper Garonne and the Lot, and taking its name from the river Tarn, which traverses it from E. to W. Its territorial extent is 6080 kilometres, and its population comprehends 272,163 persons. It is divided into 4 circles, 35 cantons, and 356 communes. The circles are Gaillac, including 59,501 inhabitants; Alby, 63,064; Castres, 106,918; and Lavaur, 42,680 inhabitants. Its contributions in the 11th year of the French era, amounted to 2,693,820 francs; and its expences to 252,749 fr. 18 cents. According to Hassenfratz, its extent in French leagues is 30 in length, and 20 in breadth: it is divided into 5 circles and 48 cantons, and its population comprehends 289,148 souls. Its capital is Alby. This department is diversified with hills and plains, and abounds in a variety of productions, *viz.* grain, flax, hemp, wine, fruits, and pastures. It has considerable forests, with mines of iron, copper, lead, coal, quarries of marble, &c.

**TARNA**, a town of Sweden, in the lapmark of Umea: 145 miles N.W. of Umea.

**TARNAC**, a town of France, in the department of the Correze, on the Vienne; 25 miles N. of Tulle.

**TARNAVAY**, a town of Hindoostan, in the county of Calicut; 20 miles N.E. of Paniany.

**TARNISHING**, a diminution of the natural lustre of any thing, especially of a metal.

Gold and silver, when tarnished, resume their brightness, by setting them over the fire in certain leys. Copper, pewter, &c. that are tarnished, recover their lustre with tripoli and potashes.

**TARNOGROD**, in *Geography*, a town of Poland, in the palatinate of Belz; 52 miles W.S.W. of Belz.

**TARNOPOL**, a town of Austrian Poland, in Galicia; 72 miles E. of Lemberg. N. lat. 49° 30'. E. long. 25° 40'.

**TARNOW**, a town of Austrian Poland, in Galicia; 52 miles S.W. of Sandomir. N. lat. 49° 56'. E. long. 20° 53'.

**TARNOWITZ**, a town of Silesia, in the principality of Oppeln, near which is a silver mine; 6 miles N. of Ober Beuthen. N. lat. 50° 25'. E. long. 18° 47'.

**TARO**, a river which rises in the southern part of the duchy of Parma, and runs into the Po, 9 miles E. of Buffeto. The country through which it passes is called *Val di Taro*.—Also, a late department of France, formed by the duchies of Placentia and Parma.

**TARO**, in *Commerce*, a money of account and copper coin of Naples, Sicily, and Malta. For the accounts at Malta, see *Scudo*. The banks at Naples keep their accounts in ducati, tari, and grani. A ducat contains 5 tari, 10 carlini, or

40 cinquini: a taro, or tarino, is worth 2 carlini, or 20 grani. Among the silver coins are tari, at 2 carlini. By the coinage of 1804, the piece of 12 carlini should contain 350½ English grains of fine silver; so that it is worth 49*d.* sterling; and the ducat of 10 carlini is worth 41*d.* sterling nearly, or 1*l.* sterling = 5 ducats 88 grani. The taro of Sicily is worth about 4*d.*, or more accurately, 1*l.* sterling = 1 ounce 28 tari 15 grani.

**TAROATAIHETOOMO**, is the name of one of the two first or supreme deities at Otahete: the other, who is supposed to have been a rock, is called *Tepapa*. These produced a son called *Tane*, to whom their prayers are generally addressed, and who is supposed to interest himself in the affairs of mankind; and a daughter called *Tellowmatatayo*, the *Year*, from whom proceed the months and days. From the two first beings they suppose also to have sprung an inferior race of deities called *Eatuas*. Hawkefworth's *Voy.* vol. ii. p. 238.

**TARODUNUM**, in *Ancient Geography*, a town of Germany, near the Danube, and in the vicinity of Aræ Flavix.

**TAROM**, in *Geography*. See **TARUM**.

**TARON**, or **TIROAN**, a town of Persia, in the province of Adirbeitzan; 120 miles S.E. of Tauris.

**TARONA**, in *Ancient Geography*, a town of the Tauric Chersonesus, S.E. of Taphra, and E. of Satarcha.

**TARONCHI**, in *Geography*, a town of Hindoostan, in Mysore; 15 miles S.S.W. of Chinna Balabaram.

**TAROUC YAMDSOON**, a lake of Thibet, about 53 miles in circumference. N. lat. 31° 52'. E. long. 84° 38'.

**TAROUCA**, a town of Portugal, in the province of Beira; 9 miles S. of Lamego.

**TAROULA**, a town on the east coast of the island of Tidor. N. lat. 0° 42'. E. long. 127° 20'.

**TAROOURS**, a town of Hindoostan, in Berar; 30 miles N.N.E. of Neermul.

**TAROUT**, a town of Arabia, in the province of Hedsjas; 32 miles S.E. of El Catif.

**TARP**, a town of Sweden, in the province of Dalland; 12 miles N. of Uddevalla.

**TARPANS**, a kind of wild horses in the Caucasian desert, E. of the river Yaik. They are of a middling size, roundish, short, generally of a blueish-grey colour, with big heads, and ewe-necked. They are taken with a noose, and broken to the saddle by being coupled to a tame horse.

**TARPAULIN**, or **TARPAWLING**, is a piece of canvas, well pitched and tarred over, to cover the hatchways of a ship at sea, in order to prevent the penetration of the rain or sea-water, which may occasionally rush over the decks.

The term is also used in derision for a person bred at sea, and educated in the mariner's art. We also, of late, use it to express a painted floor-cloth.

**TARPAULIN Cove**, in *Geography*, a bay on the S. of Massachusetts, near Falmouth.

**TARPEIAN**, **TARPEIUS**, in *Antiquity*, an epithet given to a rock in ancient Rome, of considerable height; whence, by the law of the Twelve Tables, those guilty of certain crimes were precipitated. It was on this rock that the Capitol was built.

The Tarpeian rock might formerly be steep enough on one side to break a man's neck; but it could never have been of that surprising height mentioned by some writers, if any judgment can be formed from its appearance at present. See *Bunnet's Letters*, p. 238, and *Miffon's N. Voyage*, p. 103.

It took its name from a vestal, called *Tarpeia*, who betrayed the Capitol, of which her father was governor, to the Sabines; on condition that they would give her all they bore

bore on their left arms, meaning their bracelets. But, instead of bracelets, they threw their bucklers (which were likewise borne on their left arm) upon her head, and crushed her to death.

Others ascribe the delivery of the Capitol to her father, Spurius Tarpeius; and add, that he was precipitated down this rock by Romulus's order, and that this henceforward became the punishment of all criminals of the like kind.

*TARPEIAN Games, Ludi Tarpeii*, were games instituted by Romulus in honour of Jupiter Feretrius; and called also *Capitolini ludi*. See *CAPITOLINE*.

*TARPORLEY*, in *Geography*, a small market-town in the hundred of Edisbury, and county palatine of Chester, England, is situated on the great road from London to Chester, at the distance of 172 miles N.W. from the former, and 11 miles E.S.E. from the latter. In ancient records, Tarporley is called a borough, and the houses burgages: it had in former times a mayor, as appears by deeds of the years 1348 and 1396: it is now governed by a constable. The market, which was originally on Tuesday, was granted in 1281 to Hugh de Tarporley, then lord of the manor: it had been many years disused, but was restored in 1705 by Sir John Crew, who also procured a grant of three annual fairs, and built a market-house. The parish of Tarporley, which includes the townships of Eaton, Rushton, and Utinton, contained in the year 1811, according to the population report, 365 houses, and 1852 inhabitants. An annual fox-hunt, of great celebrity, is held at Tarporley, on the first week in November, during which week are horse-races, at a place called Crab-tree Green, on Delamere forest.

About two miles southward of Tarporley rises the great insulated rock of Beeston. It is composed of sand-stone, and is nearly perpendicular on one side, which gives it a tremendous appearance, but the other side gradually slopes to the level of the country. Its height is 366 feet. On the crest of this rock are the stately ruins of the far-famed Beeston castle, whose almost impregnable strength was once proverbial. This fortress was erected in 1220 by Ranulph de Blundeville, earl of Chester. It consisted of an outer and inner area. The outer was defended by a strong wall, fortified with round towers, which ran across the slope from one end of the precipice to the other. Some parts of this wall, and six of the towers, are still extant. The area inclosed is nearly five acres. The castle was defended, on one side of the area, by a deep ditch cut out of the solid rock; on the other, by the abrupt precipice that overhangs the vale of Cheshire. The entrance is through a noble gateway, guarded on each side by a great round tower, with walls of prodigious thickness. During the civil wars of the 17th century, this fortress was alternately besieged by the royal and parliamentary forces; and in 1646 was dismantled by order of the parliament.—Lysons's *Magna Britannia*, vol. ii. part 2. Cheshire. Beauties of England and Wales, vol. ii. Cheshire, by J. Britton and E. W. Brayley.

*TARPOU*, a lake of Thibet, about 60 miles in circumference. N. lat. 30° 32'. W. long. 81° 54'.

*TARQUINIUS PRISCUS*, *Tarquin the Ancient*, in *Biography*, the fifth king of Rome, was the son of an opulent merchant of Corinth, who, escaping from tyranny at home, settled at Tarquinii, in Etruria, where he married a female of rank, by whom he had two sons. One of them died, and the other, named Lucumo, was urged by his wife Tanaquil, a lady of rank and of ambition, to remove from Etruria to Rome; where he changed his prænomen Lucumo into Lucius, and his family name Damaratus into Tarquinius, borrowed from his native city. Here he ingratiated him-

self by his manners with Ancus Martius, the king, and also with the people; and by the liberal application of his wealth to public purposes, particularly to the support of the wars in which Rome was engaged, as well as by his skill and valour in the field, he gained a reputation which served to advance him to the rank of patrician and senator. Ancus also appointed him to the confidential office of guardian to his two sons. Upon the death of Ancus, B. C. 616, the ambition of Tarquin prompted him to take measures for securing the succession to himself. The crown being elective, he contrived, by bribes and solicitations, to obtain the suffrages of the people, who proclaimed him king; and in order to strengthen his interest in the senate, he introduced from plebeian families 200 new members into this body. In his wars with the Latins, he took several of their towns, and obliged the Sabines and Etrurians, whose confederacy he defeated, to seek an alliance with Rome on humiliating terms. Tarquin, in honour of his success, was granted a triumph; and the spoils of war were devoted to the erection of the Circus Maximus, for the exhibition of the Roman or great games. The Etrurians, having afterwards rebelled, obtained peace upon condition of their recognizing Tarquin as their sovereign. During an interval of peace, after a nine years' war, Tarquin employed himself in improving the city, by enclosing it with walls, and by constructing those sewers, which were in subsequent times the objects of admiration. On occasion of a new war with the Sabines, Tarquin, whose army was deficient in cavalry, augmented the strength of each division; and having defeated the Sabines, they submitted, and surrendered all their fortresses to the Romans. At this time Tarquin fulfilled his vow of erecting a temple to Jupiter, Juno, and Minerva, on the Tarpeian rock; and by this act he acquired the honour of founding the principal seat of the Roman worship. Having attained to his 80th year, the sons of Ancus took occasion to make an attempt for defeating his plan of continuing the crown in his own family by the marriage of his daughter to Servius Tullius, by conspiring against his life. They so far succeeded as to procure the assassination of the king. His queen Tanaquil, however, by keeping the event secret, adopted measures for securing the succession of her son-in-law: and the sons of Ancus, whose plot had been detected, went into voluntary banishment. Thus ended, in the year B. C. 570, the prosperous and splendid reign of Tarquin the elder, one of the most illustrious of the Roman kings, and equally distinguished by his conduct in peace and in war. Univ. Hist.

*TARQUINIUS SUPERBUS*, or *Tarquin the Proud*, supposed to have been a grandson of the elder Tarquin, ascended the throne in the year B. C. 534. His government was arbitrary and tyrannical, and it was supported by a band of foreign mercenaries, employed in the defence of himself and his party, who had contributed to advance him to the throne in contempt of the suffrages of the people. Many of the principal senators dreading the fate of those who were made the victims of his suspicion and avarice, retired into a voluntary exile. The plebeians, at first pleased with the humiliation of the senate, had some reason to complain of the yoke imposed upon themselves. The laws that had been made in their favour were abrogated; spies and informers watched their words and actions; and all public assemblies for business or amusement were prohibited. Tarquin, conscious of the odium of the Roman citizens, took measures for ingratiating himself with the allies; and with this view, he erected a temple near the ruins of Alba, consecrated to Jupiter Latiaris, at which the diets of the confederate cantons were annually to assemble; the Romans,

as chief members of the confederation, presiding at the sacrifices and deliberations. This institution contributed to the strength of the Roman state, and the extension of its dominion throughout Italy. Having taken up arms against the Volscians and Sabines, he returned, after a successful war, to Rome, and twice triumphed; and he took occasion to finish the great circus and the sewers, which his grandfather had begun. But a war again commenced with some discontented patricians, who had taken refuge at Gabii, a Latin city not far from Rome; and this war lasted seven years. At length Gabii was conquered by the treachery of Sextus, one of Tarquin's sons; and the inhabitants, whom he treated with lenity, were incorporated with the Romans. During the reign of this Tarquin, the Sibylline books were brought to Rome, as we have related under that article, and the Capitoline temple finished. Ardea, the capital of the Rutuli, was the next object of Tarquin's military enterprise; and this circumstance was the remote cause of the rape of Lucretia by Sextus Tarquin, which at length occasioned the expulsion of the Tarquinian family from Rome, as well as the extinction of the kingly government. Brutus, availing himself of the passionate excitement among the multitude by the tragic fate of Lucretia, and exposing the tyrannical government under which Rome groaned, obtained a public decree for the banishment of Tarquin and his sons, and the army concurring in this resolution, the king was reduced to the necessity, at the age of 76, B. C. 509, to abandon his capital, and take refuge at Cere, in Etruria. Many attempts were made for his restoration, but all proved ineffectual. Tarquin retired into Campania, and died there, in the 90th year of his age, and 14th of his exile. Possessing talents fit for command, he was nevertheless violent, cruel, and wholly unprincipled. Univ. Hist. Gen. Biog.

TARRA, in *Ancient Geography*, a town of Asia Minor, in Lydia.—Also, a town and mountain of Crete.

TARRABERRY, in *Geography*, a town of Bengal; 30 miles N. of Dinagepour.

TARRABOGA, a town of Bengal; 45 miles S. of Doefa.

TARRACE, TARRASS, *Terrace*, or *Terrass*, a coarse sort of plaster, or mortar, durable in the wet, and chiefly used to line basins, cisterns, wells, and other reservoirs of water. See *Calcareous CEMENT*.

That which is called the Dutch terrass, is made of a soft rock-stone, found near Collen, upon the lower part of the Rhine; it is burnt like lime, and afterwards reduced to powder by means of mills: from thence it is brought to Holland in great quantities, where it has acquired the name of Dutch terrass. It is of a greyish colour when it is not mixt, which is very seldom the case: because it is very dear, and the demand for it in aquatic works very great. It is said that in some parts of England there is found a soft stone, resembling that of Dutch terrass, and which might serve as well in aquatic works.

An artificial terrass, resembling the true, may be formed of two parts of lime, and one of plaster of Paris, well beaten together, and used immediately. There is another sort of terrass, used for coarser uses, which is sometimes called *Welsh* terrass, formed of one part lime, and two parts of well-sifted coal-ashes, thoroughly mixt by being well beaten together. Handm. to the Arts, vol. ii. p. 32.

TARRACO, in *Ancient Geography*, a town of Hispania Citerior, belonging to the Cofetani. This was an ancient town in the time of the Romans. Some Spanish authors have attributed its foundation to Tubal. Others, with greater probability, ascribe it to the Phœnicians, who called it Tarcon, which the Romans changed into Tarraco. Having

been destroyed, it was re-established by the two Scipios. At length it became the capital of that region, to which it gave the name of Hispania Tarragonensis. Augustus visited this city on occasion of his war against the Cantabri; and it was here that the first altar was erected to his honour. Galba, A. D. 68, was presented by the Tarraconians with a crown of gold. It was in the year 121 or 122 that Adrian re-established the temple built in this city in honour of Augustus, under the reign of Tiberius. See TARRAGONA.

TARRAGON, in *Botany*, a name sometimes given to *southernwood*; which see. See also ARTEMISIA.

TARRAGONA, in *Geography*, a town of Spain, in the province of Catalonia, situated on a rising ground on the coast of the Mediterranean, at the mouth of the river Francoli, and one of the most ancient cities in Spain, said to have been founded by the Phœnicians. Under the Romans it was the capital of a province, called Tarragonensis, and was fortified by Scipio as a defence against the Carthaginians. In the year 467 it was taken by the Goths, and levelled with the ground. In 516, a council was held here, in which monks are first mentioned; when it was ordained that the sabbath should commence on Saturday evening. It afterwards fell into the hands of the Moors, from whom it was recovered in the latter part of the 11th century, and rebuilt by the archbishop of Toledo, who was by the pope absolved of the oath he had taken of going to the holy war, on condition that he would lay out the sum designed for that expedition in rebuilding Tarragona. In the war of the succession, the English obtained possession of this city, and intended to keep and fortify it, by bringing the river Francoli quite round it; and for this purpose threw up vast out-works and redoubts, the ruins of which are yet visible. On the possession of Gibraltar, they gave up the design. The environs at Campus Tarragonensis they esteem one of the most fertile spots in Europe. Tarragona has but few remains of its ancient grandeur; inscriptions almost destroyed by time, some coins, and a few ruins, give but an imperfect idea of what it formerly was. It is now depopulated, and of little importance. The harbour is dangerous, and not much frequented; there are a few bastions in bad repair, which were formerly built for its defence. Tarragona is, however, the see of an archbishop, the metropolis of Catalonia, and disputes with Toledo the primacy of Spain. The establishment of the see is said to have been in the first ages of the church: the succession of archbishops was interrupted by the Moors, and remained suspended until the 11th century. The cathedral is worthy of attention for its vast dimensions, the elegance of its Gothic architecture, and a magnificent chapel, built with rich marble and jasper, in honour of St. Thecla, tutelar saint of the church; 98 miles E.S.E. of Saragossa. N. lat. 41° 8'. E. long. 1° 33'.

TARRAGUNGE, a town of Bengal; 22 miles S.E. of Moorshedabad.

TARRAPOUR, a town of Hindoostan, in Bengal; 17 miles S.W. of Boghlopour.—Also, a town of Hindoostan, in Malwa, on the Nerbuddah; 12 miles S. of Mundu.

TARRAR, a circle of Hindoostan, in Allahabad, bounded on the north by Allahabad Proper, on the E. by Chunar, on the south-east by Boghileund, and on the west by Bundeleund; about 35 miles long, and 12 broad.

TARRASA, a town of Spain, in Catalonia; 13 miles N. of Barcelona.

TARRATZ POINT, a cape on the north coast of St Vincent. N. lat. 13° 24'. W. long. 65° 15'.

TARREGA, a town of Spain, in Catalonia, on the Cervera;

Cervera; 5 miles W. of Cervera. N. lat.  $41^{\circ} 36'$ . E. long.  $0^{\circ} 19'$ .

TARRIE, in *Commerce*, a measure at Algiers for corn and dry goods, holding somewhat less than  $2\frac{1}{4}$  pecks English measure; 16 taries make a caffise.

TARROCK, in *Ornithology*, the name of a sea-fowl of the larus or gull-kind, and distinguished by authors by the name of the *larus cinereus Bellonii*; and called by Linnaeus the *LARUS tridactylus*; which see.

It is of the size of the common pigeon, and is not much unlike it in shape, except that the head is larger and thicker. The bill is black, short, thick, and strong; the throat, neck, and under side are white; near each ear, and under the throat, is a black spot; on the hind part of the neck is a black crescent, with the horns pointing to the throat.

Its great distinction, however, from all the other birds of the gull-kind, is, that it has no hinder toe, but in lieu of it a small protuberance. It is very common on the coasts of Cornwall, and some other of the English shores. Ray and Pennant.

TARRY-TOWN, in *Geography*, a town of New York, where major André, of the British army, was apprehended as a spy; 24 miles N. of New York.

TARSAH, a town of Hindoostan, in Berar; 18 miles E. of Nagpour.

TARSI, in the *Materia Medica*, a name by which some authors have called the root of the *cyperus esculentus*, or sweet cyperus of the shops, and by which it is, in some places, usually called by the druggists. See AVELLANDA and HABHAZZIS.

TARSO, in the *Glass Trade*, a sort of white stone found in many rivers in Italy, and other places; and used instead of sand for the finest crystal-glass, being first burnt, and calcined with the salt of the pulverine into frit. Neri's Art of Glass, p. 7.

Neri calls this stone a kind of white marble; and adds a general rule, that all stones that will strike fire with steel, are fit to vitrify; and those that will not strike fire with steel, will never vitrify.

The criteria or determinate characters of fossils were not at all fixed in this author's time, otherwise he had not called this stone a kind of marble; since his own general rule of trying stones by steel is, though liable to a few exceptions, a very good one; and, according to that, this tarso could be of no affinity to marble; for marble will not strike fire with steel, nor ever be converted into glass.

The tarso, therefore, of this and other authors, could be nothing of the marble kind; but is truly a crystalline matter debased by an admixture of white earth, and found in form of small pebbles, of a whitish, yellowish, or pale reddish colour; and this is common in all the gravel-pits of England, and in the beds of some of our rivers; and might be used with great advantage by our glass-makers, if they knew it was so easily to be had.

On comparing these stones of ours, with the cuogoli, or tarso of the foreign glass-makers, there is no difference distinguishable to the eye, nor will the nicest experiments by the fire, acid menstrua, &c. shew the least distinction between them. We are not to wonder, however, that the glass-makers did not hitherto distinguish this to be the true cuogoli, or tarso, since the characters of fossils have been hitherto so little ascertained, that the best and latest author on these subjects, Dr. Woodward, so far mistook the structure of this stone, as to call it a sparry pebble. It is certain that spar could never have any thing to do with glass-making; but this stone has no spar in its composition.

TARSUS, in *Ancient Geography*, a town and country of Asia, in Bithynia. Steph. Byz.

TARSUS, in *Geography*, a sea-port town of Asiatic Turkey, in the government of Marasch, said to have been founded by Sardanapalus. It was at one time the capital of Cilicia, and traversed by the river Cydnus. It is mentioned by Dionysius Periegetes, Ptolemy, Mela, Pliny, and Strabo, the latter of whom says, that it was very powerful and populous; that its inhabitants excelled in the study of philosophy, and of all the sciences cultivated among the Greeks; indeed in this respect they surpassed Athens, Alexandria, and all other academies in the world. It is now inhabited by Turks, Greeks, and Armenians, and is the see of a Jacobite bishop and Nestorian archbishop. It is large, and surrounded with a double wall. St. Paul called himself a native of Tarsus; and here the emperor Julian was buried. It has been said that in the time of St. Paul, Tarsus was a Roman colony, and that the apostle was a citizen of Rome by virtue of his nativity at Tarsus. (Acts, xxi. 37—39. ch. xxii. 3.) But Dr. Lardner has particularly examined this point, and alleged several arguments to prove, that Tarsus, though it was no mean city, as St. Luke says, was not a municipium, or town of Roman citizens. (See ST. PAUL.) Tarsus was taken by the Saracens in 640; 25 miles W. of Adana. N. lat.  $37^{\circ} 1'$ . E. long.  $34^{\circ} 37'$ .

TARSUS, in *Anatomy*, that part of the foot (consisting of about its posterior half) to which the leg is articulated. Its front portion corresponds to the intep in common language. See EXTREMITIES.

The same name is applied to the portion of cartilage contained in each eyelid. See EYE.

TARTAGLIA, NICHOLAS, in *Biography*, a celebrated mathematician, was born at Brescia about the beginning of the 16th century. Being left destitute in his childhood by the death of his father, he was no less unfortunate at the siege of Brescia in 1512, in receiving several wounds, and particularly one which divided his lip, so that he lost the power of distinct articulation; and from this circumstance he got the name of Tartaglia. The defects of his early education were amply compensated by his genius and diligence. Having resided ten years at Verona, he afterwards, viz. in 1534, became professor of the mathematics at Venice; and here, except during an interval of eighteen months at Brescia, he remained till the time of his death, in 1557. His works are numerous. Besides translations of Archimedes and Euclid, he wrote many original treatises in mathematics, one of the most important of which, entitled "Questi e' inventione diversi," was published at Venice in 1546, and dedicated to Henry VIII. of England. It is comprehended in nine books, and contains answers to several questions that were proposed to him at different times concerning mechanics, hydrostatics, &c.; and more particularly worthy of notice is the history of the invention of the rules for solving cubic equations, which he communicated to Cardan, under an oath that he would keep the secret. (See ALGEBRA and CARDAN.) Tartaglia's genius was no less conspicuously displayed in other sciences than in algebra. He treats of artillery and gunnery, and also of the different methods of fortifying towns, besides various mechanical and algebraical questions. He also proposes many questions with regard to the motion of bodies, and the method of measuring distances, in his "Nuovia Scienza" and "De' Numeri e Misure." To Tartaglia we owe the first discovery of the best angle, i. e.  $45^{\circ}$ , as it was then thought, for elevating a piece so as to throw a ball or shell to the greatest distance. He also announced a method of raising vessels that were

funk, and other heavy bodies, from the bottom of the sea, and the means by which a person may be enabled to remain a considerable time under water; and to him we owe a treatise on the signs which indicate changes in the atmosphere. He has likewise furnished us with a large treatise on arithmetic, algebra, and geometry, published at Venice, in folio, in 1556. Tiraboschi remarks, that all Tartaglia's works manifest great penetration and acuteness, and that they would claim higher commendation, if the author had paid more attention to his style, and if the editions were more correctly printed. But with all their imperfections and faults, and after all the improvements to which they have led the way, they were justly esteemed at the time when they were written, and they have been useful to those who have in more modern times pursued the same course of study and investigation. Tiraboschi. Montucla. Hutton.

Tartaglia is mentioned by Pietro della Valle among great Roman musicians in 1640, and the composer of "Clearco," the first opera that was performed at a public theatre in Rome. For though several musical dramas had been exhibited in the palaces of ambassadors and other great personages in that city, no theatre had been previously opened there for the public at large.

TARTAGLINI, LA ROSA, the daughter of Tibaldi, an excellent tenor singer in the service of the emperor at Vienna. She was extremely celebrated for her beauty and agility of voice, and quitted the stage in 1768.

TARTALA, in *Geography*, a town of Hindoostan, in Calicut; 21 miles E. of Paniany.

TARTAN, in *Sea Language*, a small coasting vessel navigated in the Mediterranean sea, and having only one mast and a bowsprit, the principal sail, which is extremely large, being extended by a lateen-yard.

When tartans put up a square sail, it is called a *sail of fortune*.

TARTAR, TARTARUS, or *Tartarum*, in *Chemistry*, an acid concrete salt which rises from wines, after complete fermentation, and sticking to the top and sides of the casks, forms a crust, which hardens to the consistence of a stone. It is in this state a hard, brittle, brown-red mass, interspersed with imperfectly crystallized particles; and called *crude* or *rough tartar*, or *argol*, by way of distinction from that which is purified.

Its goodness rather depends on the number of repeated fermentations, which a succession of new wines in the same casks for several years makes, than on the soil or climate where the wine is produced.

The sweet wines afford always less tartar than the sharp ones, and it is also less valuable. The tartar of Rhenish wine is better than that of any other; and in general those wines which have the most acid in them, and which are the most coloured and strongest-bodied, afford the greatest quantity of tartar, and that in the largest crystals.

The taste of tartar is vinous, and slightly acid. It is not entirely a product of fermentation, for it is contained in the "must," or grape juice, and assists in the process of fermentation, and the production of alcohol. This salt has also been found native, under different combinations, in some other vegetable juices.

Besides the usual way in which tartar is produced, there is a very remarkable account in the Memoirs of the Academy of Sciences at Paris, an. 1737, of its having been found in a more than ordinary beautiful state on a human skull: the discovery was owing to accident, and it was found that there had been lees of wine in the vessel in which the skull had been laid ten days in soak.

The formation of the crystals of this tartar on the skull, while the sides of the vessel had none created on them, shews that the skull had a disposition for receiving the crystals more than any other body; and their peculiar brightness proves, that it had some share in their formation.

Tartar consists of a large quantity of extractive matter, scarcely soluble in water, to which it owes its colour, and of a salt, quite white when pure, composed of acid of tartar united to a small portion of potash, less than is required for the saturation of the acid, but which, in this proportion, forms a distinct crystallizable salt of considerable importance in several arts and manufactures.

Tartar is either *white*, or *red*, according to the colour of the wine from which it is produced. That brought from Germany is the best, as being taken out of those monstrous tents, some of which hold a thousand pipes of wine, so that the salt has time to come to its consistence, which is one of the chief qualities to be regarded in tartar. That of Montpellier is the next in order; then that of Lyons, Paris, &c.

White tartar is preferred to red, and is really better, as containing less of the drossy or earthy part; though both kinds, when purified, are exactly the same. The marks of good tartar of either kind are, its being thick, brittle, brilliant, and but little earthy.

Tartar, in its *crude* state, is much used as a flux in the assaying of ores. As it contains both alkali and carbonaceous matter, it acts both in assisting the fusion of refractory ores, and in reducing metallic salts and oxyds. When heated *per se* to redness in close vessels, the extractive matter and the tartareous acid both become charred, and the result is a black alkaline carbonaceous mass. In open vessels the charcoal burns off totally, and at last nothing remains but pure white carbonate of potash. But tartar is for the most part refined, in order to obtain the pure salt; which is called *purified tartar*, *cream of tartar*, *crystals of tartar*; or more accurately, according to the modern nomenclature, *acidulous tartrate of potash*, or *super-tartrate of potash*, and sometimes with less precision, simply *tartar*. This salt is purified in large quantities at Venice, and in France near Montpellier, by two different processes, which have been described by Desmaret (*Journ. Phys.* tom. i. p. 67.) and by M. Fizes (*Mem. de l'Acad.* for 1725), and which we shall here extract from Aikin's dictionary. At Venice the method is as follows: "The crude tartar is first dried in an iron boiler, with a very gentle heat and frequent stirring, that the acid may not be burnt, and is then pounded in iron mortars. The ground tartar is then distributed into wooden tubs, and boiling water poured upon it, which dissolves the salt, and leaves a sediment, which is thrown away. The clear solution is left three days at rest, during which time it deposits brownish crystals of tartar. The mother-liquor from this operation is reserved, and is used hot in the subsequent processes in the first lixiviation of the tartar. The brownish crystals of tartar are then put into a copper boiler, with the mother-liquor of former processes, and slowly brought to boil, by which a saturated solution of a deep yellow wine-colour is produced. This is clarified in the following way: a workman stands by the side of the copper with a basket of eggs, and a bucket full of finely sifted wood-ashes. He begins with breaking one of the eggs, and putting the white of it only into a bowl; he beats this up with some of the boiling liquor, and then pours the whole into the boiler: he then instantly throws in a ladleful of the wood-ashes, and stirs up the liquor from the bottom. A brisk effervescence takes place, and the surface is covered with a red scum, which is carefully taken off with a perforated skimming-dish, and

## TARTAR.

and put aside: a second portion of ashes is then added, and the effervescence and scum are renewed and treated as before. The whole of this operation is repeated fourteen or fifteen times, after which the liquor becomes quite clear and colourless. The fire is then withdrawn, and the liquor suffered to remain perfectly at rest for three days. On the fourth, a dirty white saline crust is removed from the surface, and two-thirds of the liquor laded out: the crystals on the sides are then collected by a ladle, and washed in the remaining liquor; they are thus obtained perfectly clean, and require no further preparation than drying on a wicker frame. The crystals from the bottom are still somewhat coloured, and are either sold as an inferior sort, or are refined again with fresh portions of the crude tartar. The liquor that remains in the boiler, after the deposition of the crystals, is a cold saturated solution of tartar, and is employed in the first lixiviation of the rough tartar."

The method used near Montpellier has been found so convenient and effectual, that it has continued without any material alteration for a century. It is as follows: "The apparatus required for this purpose is, 1st, a large copper boiler; 2d, a stone cistern, larger than the boiler; 3d, a number of glazed earthen pots (generally twenty-seven), which, together, hold somewhat more than the boiler; 4th, some strainers of coarse cloth stretched on wooden frames; 5th, four smaller copper boilers, which, together, hold as much as the larger boiler, and are used in the refining part of the process; and 6th, a mill to grind the tartar.

"The large copper is first filled with two-thirds of mother-liquor, remaining from the previous operations, and one-third of spring-water; a quantity of rough tartar is then thrown in, and, when the liquor is saturated and boiling, it is strained into the earthen pots. In about half an hour the liquor in these pots, though still very hot, begins to deposit crystals on the surface and sides of the pot; during which time, more liquor and tartar are thrown into the large copper, as at first.

"The liquor in the pots is then emptied into the stone cistern, leaving the crystallized crust of tartar behind; and when the second boiling is saturated, the pots are again filled as before, and the large copper again charged with the clear liquor from the cistern, and fresh tartar. By thus five times alternately preparing a hot saturated solution, and allowing it partially to deposit its tartar in the pots, the latter become lined to a considerable thickness with a crust of reddish-white tartar, much purer than at first, and which obviously consists of an irregular crystallized saline mass, and when washed with cold water, is fit for the second or proper refining process. For this purpose the four small boilers are filled with water, in which a small quantity of clay is diffused, which renders it milky, rejecting the stony and larger particles of earth. The half-purified tartar is then added in such proportion, that the water, when boiling, shall be sufficient to dissolve all the soluble part, and the ebullition is continued for a quarter of an hour; the fire is then withdrawn, and the liquor allowed to remain at rest till the next day. It is then found covered on the surface with a white hard saline crust, and a similar crust, but more distinctly crystallized, has concreted on the sides and bottom of the boiler. They are both very pure tartar, the crust on the surface, which is an amorphous mass, is called *cream of tartar*; and the other, *crystals of tartar*; but they are indiscriminately mixed.

"The crust is then broken down, and falls to the bottom; and the liquor, which is a clear pale red, is poured off gently into the stone cistern, till it begins to run white, owing to the clay at bottom, which latter portion passes into a separate vessel. The whole mass of solid tartar left in the boiler

is then washed with cold water, till all the foulness (which is merely superficial) is got out, and the water comes away quite clear; after which the purified tartar is taken out, and dried on stoves or in the sun, and is perfectly pure and white. The ordinary rough tartar yields about three-fifths of its weight of the white pure salt. All the residuary liquors are employed in subsequent operations, in the way already mentioned."

Schaub says (*Annal. de Chim.* xlix. 61.), that tartar may be purified by simply boiling it with powdered recent charcoal, and thus very white crystals are obtained.

TARTAR, *Burnt*, a preparation used by glass-manufacturers, and consisting of large lumps of red tartar, burnt or calcined in earthen pans in an open fire, till they have done fuming: it is of a blackish purple colour. Neri's Art of Glass.

TARTAR, *Cream of*, *Cremor Tartari*. See CREAM of Tartar, TARTAR, *supra*, *Super-tartrate of Potash*, under SALTS, and TARTRITES.

Cream of tartar has a sensibly acid taste; it reddens the blue colours of vegetables; it may be saturated by uniting with any of those substances, which are capable of forming with acids neutral salts; and it may be afterwards separated from those substances, and recover its former appearance.

In the arts, and in the materia medica, this is a very valuable salt. It is much used in dyeing, more especially in giving the scarlet and other modifications of the cochineal colours. It is also often combined with alum, as a mordant in fixing colours. (See DYEING.) As an article of the materia medica, cream of tartar, dissolved in water, forms an agreeable and cheap acidulous drink; and as a sweetener of the blood, some have taken it in whey or water-gruel, in the spring-time, to the quantity of half an ounce every morning, for three or four weeks. The solution in water, sweetened with sugar, is a pleasant beverage in febrile diseases, when its purgative quality is not likely to prove injurious. See the next article.

The difficult solubility of cream of tartar being an objection to its medical use, some experiments were made by Dr. Peter Jonas Berg, for rendering it more soluble by certain additions, without altering its medicinal qualities. Borax was found to answer best for this purpose. To four parts of cream of tartar one of borax was added. These were dissolved in a sufficient quantity of water, and the liquor strained: about a sixteenth part of impurities was left behind. The pure solution evaporated yielded an acid, and extremely soluble white salt. Lemery has also recommended borax. It has, however, been observed, that as borax contains an excess of alkali, the acid of the tartar would be neutralized, and a very different salt would be produced, *viz.* the *tartrate of potash and soda*; which see. *Nova Act. Phys. Med. Acad. Cæs. Leop. Carol. Nat. Curios.* tom. iv.

TARTAR, *Crystals of*. See TARTAR, *supra*, and TARTRITES.

These crystals are small and irregular, but generally run together into little masses of a white colour, semi-transparent, brittle, and easily reduced into powder. Crystals of tartar are in common use as a laxative and mild cathartic; they are also esteemed for their cooling and diuretic qualities, and have therefore been much employed in dropics, and in other cases requiring an antiphlogistic treatment. Dr. Cullen says, that in large doses they act like a purgative, in exciting the action of the absorbents in every part of the system, and more powerfully than the operation of any entirely neutral salts. On this property is founded their utility in the case of dropsy. They occasion a considerable discharge of serous fluid into the bowels, which is thrown off

in the form of ferous stools; the discharge by urine being also augmented. The water in the cavity of the abdomen is thus rapidly carried off; and the chances of a return of the disease are supposed to be fewer than when other diuretics are employed. It is remarked, that they do not readily pass off by the kidneys, unless they are taken with a large quantity of water; and, therefore, when intended as a diuretic, they ought to be given in a liquid form, as Dr. Holme has directed. It has been suggested, that, in cases complicated with hepatic obstructions, the effects of this remedy are very uncertain. It may be advantageously united with squills; and, on account of the exhaustion which it occasions, the use of it should be followed by preparations of iron, and other tonics. As a purgative and hydragogue, the dose is from  $\zeta\text{vj}$  to  $\zeta\text{vj}$ , in the form of electuary; and for the latter purpose, this dose must be repeated until the kidneys are affected; diluting freely during its use. These salts enter several official compositions: such as "carbonas potassæ purissimus," Ed. Ph.; "ferrum tartarizatum," L. D.; "pulvis jalapæ compositus," E.; "pulvis scammonii compositus," E.; "pulvis fennæ compositus," E.; "potassæ tartaras," L.E.D.; "antimonium tartarizatum," L.E.D.; "soda tartarizata," L.E.D. Woodville. T. Thomson.

TARTAR, *Emetic*. See ANTIMONY.

A considerable diversity has occurred in the method of preparing this tartar, probably from want of considering, that the emetic quality of this preparation proceeds from the metallic earth being dissolved by the acid of tartar, and forming with it a kind of soluble tartar, a true neutral salt, no less capable of a very exact solution than the vegetable salt, the salt of feignette, and all the other soluble tartars. By considering this saturation as a fixed point, there may be produced only one kind of emetic tartar, always equally strong. See a detail of M. Geoffroy's experiments on this subject, in Mem. Acad. Par. for 1734. M. Beaumé directs it to be prepared by mixing together equal parts of cream of tartar, and of porphyrised glass of antimony, or rather a larger quantity of the latter ingredient. This mixture is to be thrown gradually into boiling water; and the boiling must be continued gently, till there is no effervescence, and till the cream of tartar be entirely saturated. The liquor is to be filtrated; and when it is cooled, there will be formed in it fine crystals, in the form of pyramids with triangular bases, which are a soluble tartar perfectly saturated with glass of antimony. These are transparent while moist; but by exposure to a dry air, they lose a part of the water of their crystallization, and become opaque and white. Emetic tartar thus prepared, very well produces an emetic effect when taken from a grain to two and a half, or three, according to the constitution of the patient. The result of M. Beaumé's experiments on the manner and duration of boiling this preparation is, that vessels of iron and copper ought to be avoided, and those of silver or glass used, because in these it may be boiled for any length of time, without being decomposed; and that as the intention of the operation is to perfectly saturate the cream of tartar, the boiling must be continued till this saturation be effected, which requires a long time, when the glass of antimony is grossly pounded, but a much shorter time when it is well porphyrised. Macquer, in the Chemical Dictionary, observes, that we are not certain that the emetic tartar, prepared by saturating tartar with glass of antimony, has always a uniform and constant emetic power. And therefore he recommends the powder of algaroth, or mercury of life, which, however dangerous in itself, may be rendered safe, by washing it with a little fixed alkali, which will

separate all that marine acid that communicates to it a certain degree of caustic quality. The powder thus washed, he says, is altogether soluble by cream of tartar, and convertible into a soluble emetic tartar, perfectly neutral, by boiling it, and saturating it with cream of tartar, and treating it in the manner above directed, for the preparation of emetic tartar with glass of antimony. The powder of algaroth, thus prepared, is a calx of antimony constantly of the same degree of emetic strength. The total evaporation of the fluid appears to be the best way of securing uniformity of strength to the medicine; and the solubility of the compound affords one of the best means for estimating its strength, or the degree of its impregnation with the antimony.

Dr. Saunders relates, that an ounce of cold water, about the middle temperature of the air, dissolved, of some of the common emetic tartars of the shop, not thirty-two grains, or one-fifteenth of its own weight; whereas of a well saturated fort, which he had himself prepared by long boiling, the same quantity of water dissolved fifty-two grains, or near one-ninth of its own weight.

The best way, probably, of obtaining a saturated and uniform preparation of this kind, would be to digest the common emetic tartar in eight times its weight, or less, of cold water, and evaporate the filtered yellow solution to dryness; or to continue the boiling of the glass of antimony and tartar for twelve hours, or longer, adding water occasionally to keep the tartar always dissolved, and at length to let the water waste so far, as not to exceed eight times the quantity of the tartar employed, after which the liquor is to be suffered to cool, and then filtered and evaporated. The dose of this preparation, as an emetic, is from two or three to six or eight grains. It may be given also as an alterative, or diaphoretic, in doses of a quarter of a grain, or half a grain, or more, and added, in the quantity of a grain or two, as a stimulus to the milder vegetable cathartics. Lewis's Mat. Med. by Aikin.

TARTAR, *Foliated*, is a preparation of tartar with distilled vinegar, which reduces it into white leaves. See ACETAS POTASSÆ, and TERRA FOLIATA.

TARTAR of Iron. See TARTRITE of Potass and Iron.

TARTAR, *Oil of*, is the salt of tartar exposed to the air for some days in an open vessel, in a moist place, till it dissolves into a fluid; though it is improperly called an oil, being no more than a dissolved salt.

Oil of tartar *per deliquium* is held the best counter-poison to corrosive sublimate.

TARTAR, *Regenerated*. When cream of tartar has been made soluble by any alkaline substance whatever, it may be revived, or regenerated, into cream of tartar again; its acid in this state has dissolved the alkaline matter presented to it, and that has been itself attenuated in such a manner as to render it capable of insinuating itself between the molecules or integrant parts of the constituent matter of the cream of tartar; on this only depends the solubility of this preparation: and to render the whole of its primitive nature again, there requires no more than the addition of a new acid, which shall free the tartar from this alkali; but this must necessarily be stronger than that naturally in the tartar. Thus spirit of nitre, or oil of vitriol, regenerate the soluble tartar in a moment, as being more powerful acids than that in the cream of tartar, and therefore taking from it all its alkali. The acid of distilled vinegar, which is not only a vegetable acid, but the same with that of tartar, is also able to regenerate the soluble tartars. It might seem wonderful that this should be able to effect this change without any superiority of force: but it is to be observed, that in the

## TARTAR.

cream of tartar the acid has a terrestrial and alkaline basis, which is natural to it in that form; but in the state of soluble tartar it takes a new alkaline basis, which is not natural to it: and when we view the process in this light, it does not appear wonderful, that an acid of its own kind should be able to take away from it this artificial alkaline basis, though it was not able to take from it the natural one. Mem. Acad. Par. 1733.

This second or artificial basis is different, according to the different alkalies which have been employed to render the tartar soluble, and consequently the same acid may attach itself more to one than to another of those alkalies, or quit them the more or less easily. There is one kind of soluble tartar, however, which is not to be regenerated at all; this is that which is made with borax.

Dr. Huxham says, he has often experienced the good effects of regenerated tartar in the cure of obstructions of the bowels, and for sluggish humours. See *Acetate of Potash* under SALTS, and *TERRA Foliata*.

TARTAR, *Salt of*, is made of tartar washed, ground, purified, or cream of tartar, and calcined either *per se* or with nitre, by a reverberatory fire; or it is made by pulverizing what remains in the retort after the distillation of tartar, and calcining it as above by a reverberatory fire. On the one or the other of these preparations, they pour a great quantity of hot water, to make a ley of it; this they filtrate, and evaporate the liquor by a sand-heat, till the fixed salt be found at the bottom of the vessel. This is the pure alkali, or fixed salt of tartar. See *CARBONATE of Potash* under SALTS, and *SALT of Tartar*.

TARTAR, *Soluble*, (see *Tartrate of Potash* under SALTS, and *TARTRITE of Potash*,) may be made by the following process: Take of an alkaline fixed salt, a pound; of water, a gallon; and having dissolved the salt in this water boiling, throw crystals of tartar in powder as long as any fermentation is raised, which usually ceases before thrice the weight of the alkali is thrown in. Then strain the liquor through paper, and after due evaporation set it by for the salt to crystallize, or else evaporate the liquor wholly away, that the salt may be left dry.

This salt, by the action of the alkali on the acid of tartar, being freed from those gross terrestrious parts, with which the crystals of tartar, how pure soever, remain still charged, dissolves readily, and keeps suspended in cold water.

The several alkaline salts, that of tartar itself, the common pot-ashes, borax, &c. all make a very good soluble tartar; and not only these, but the common terrestrial alkalies, whether of the mineral kingdom, as chalk or lime; or of the vegetable, as the ashes of plants after elixivation; or of the animal, as oyster-shells calcined or not calcined, and hart-horn: all these give a better or worse soluble tartar; but of these, none succeeds so well as the oyster-shell, after it has been calcined; the soluble tartar, prepared with this, costs also greatly less than when prepared with salt of tartar.

In wood-ashes there is always a part, which when mixed with water swims, and is suspended in it a long time, and at length subsides into a kind of soft and impalpable matter; and another part, which subsides readily to the bottom, and feels rough and harsh. It is the first of these substances alone, which being mixed with cream of tartar, renders it soluble: the other part will not mix with the cream of tartar, or produce any such effect, unless reduced to the nature of the first, by repeated and violent calcinations, and then only a part becomes so altered, the whole never is so. It appears that the first portion has been wholly divested of its acid by the fire, and thence is become susceptible of the impression of the weakest acid, such as is that of the cream

of tartar, but in the second, or coarser part, the acid it naturally contained remains fixed and concentrated, so that it is not susceptible of any impression from the weak acid of the cream of tartar. Mem. Acad. Par. 1733.

The different kinds of soluble tartar have also their different degrees of solubility, or different readines to run into a liquor *per deliquium*. The most easily soluble of all are those made with chalk, with lime, and with wood-ashes; and that which is most difficultly so, is the kind made with borax; it will at length run however, and is truly soluble tartar.

For the chemical and medical properties of this salt, see *Tartrate of Potash* under SALTS, and *TARTRITE of Potash*.

TARTAR, *Vitriolated*, which some call *magistry of tartar*, is a neutral salt, composed of a vitriolic acid, saturated with the fixed alkali of tartar, or with any other pure vegetable fixed alkali.

Vitriolated tartar may be decomposed by nitrous acid in the following manner, according to M. Baumé. Equal parts of both are put into a matras, and heated till the salt be dissolved. From the liquor when cold, true crystals of nitre may be obtained. And according to M. Margraaf, vitriolated tartar may, in the same method of treatment, be decomposed by marine acid.

This salt is not of any use in the arts, and little used in chemistry. It is chiefly employed in medicine. Like the other neutral salts, with bases of fixed alkali, it is aperitive in small doses, as a gros, or 59½ grs., and it is laxative, when taken from 6 to 12 gros. See *Sulphate of Potash* under SALTS.

The chemists have sometimes boasted of great virtues, in what they call the magistry of this salt; this is the earth precipitated in the making of it. It is the opinion of some ingenious authors, that all fixed salts are produced by a blending together of the acid and alkaline salts, which the plants they are obtained from originally contained, with some earth. The making of this preparation of tartar and vitriol, gives great strength to this opinion by means of this magistry; which shews, that an earth necessary to the cementing a mixture of an acid and an alkali into a neutral salt, may exist even in one of the principles themselves, though unseen by us; and that, as in the present instance, in so large a quantity, as not only to be sufficient for the combining the two volatile substances into a fixed one, but even to leave a remainder of it, that was not necessary.

While the acid of vitriol is poured upon the dissolved salt of tartar, or its oil *per deliquium*, for the making of this salt, during the great effervescence between the acid and the alkali, there is a precipitation made of an earth, for the separation of all which great care is to be had to the degree of saturation of the alkali with the acid. This earth afterwards may be severed by filtration. This earth is precipitated, not out of the spirit of vitriol, but out of the salt of tartar; and this experiment shews, that this fixed salt did originally contain that earth, which, according to the system of the formation of fixed salts out of volatile ones, originally residing in plants, must necessarily be mixed with them, and which, not being able to mix with the acid, is separated and thrown off in the conflict, in which the acid mixes itself with the rest.

This earth is what is pompously called the *magistry of vitriolated tartar*; but it is very wrong to give that name to an earth which has none of the properties of that or any other salt; and they greatly deceive themselves and their patients, who prescribe it instead of the salt itself. Its saline taste, probably, has induced them to think that it possessed great virtues; but this is not innate but adventitious,

tious, and the effect only of the fluid in which it was precipitated: it cannot but have some of the salts of that fluid hanging about it, when first made; but these may, by repeated washings, be carried wholly off, and the magistery will then remain a pure simple earth, and shew itself to be no other than that earth, which may be properly called the earth of all fixed salts; and which, though necessary to give the salt of tartar its form as a lixivial salt, yet being not necessary to it in its new form of a neutral salt, is deposited in the making it into that form. It yet remains to be proved by more numerous experiments, that the fixed salts of plants owe that form only to a fixing earth, combining their two original volatile principles into a fixed mass; for if this be truly the case, there then needs no more to the volatilizing them again, but the divesting them of this earth. Phil. Transf. N<sup>o</sup> 90.

TARTAREOUS or TARTARIC Acid, was first separated from cream of tartar, and obtained in a solid crystalline form, by a method which was discovered by Scheele, and which, with little variation, is as follows: it very much resembles the mode used by the same ingenious chemist in obtaining the citric acid: Having analysed cream of tartar (see Swedish Transactions, part iii. for 1770.), he found that this is not a pure acid, but a compound salt, containing the fixed vegetable alkali, united with a superabundance of the tartareous acid, and therefore, that it differs from soluble tartar only in the proportion of acid which it contains. For obtaining this acid, he dissolved any given quantity of the cream of tartar in boiling water, and whilst boiling, added gradually some clean powdered chalk. Upon this a copious effervescence will arise, and the addition of chalk must be continued till this ceases, when the mixture may be set by to cool. It then contains a white dense sediment, which consists of the lime of the chalk, united with the excess only of the acid of the cream of tartar; and the supernatant liquor is, therefore, a solution of the cream of tartar deprived of its excess of acid, or neutral tartrate of potash, or soluble tartar, as it is also called, and which may be obtained crystallized by subsequent evaporation. Wash the precipitated tartrate of lime repeatedly with cold water, then put it into a glass vessel, and add to it a diluted sulphuric acid, composed of as much concentrated acid, as is equal to the weight of chalk employed in saturating the cream of tartar, mixed with four or five times its weight of water.

The sulphuric acid having a stronger affinity for the lime than the tartareous acid has, totally decomposes the tartrate of lime, during a digestion of two or three days (or in a shorter time if assisted by a gentle heat,) and the white sediment, though it does not alter its appearance, is changed to sulphate of lime, whilst the supernatant liquor contains naked acid of tartar. Then pour off the clear liquor, wash the sulphate of lime to extract all the adhering acid, and add the washings to the former liquor, and evaporate the whole, (at first with a boiling heat, and as it concentrates, with a much gentler warmth,) till it is of a thick syrupy consistence, and then set it by for some hours, that all the selenite, which it may hold in solution, may be deposited. Then again dilute the mixture with cold water sufficient to redissolve every thing but the selenite, and slowly evaporate the solution to a syrupy consistence, and after some hours it will deposit the pure tartareous acid in crystals, which are generally pretty large irregular hexahedrons. Cream of tartar decomposed in this way by chalk (and therefore only partially) will yield about a third of its weight of the crystallized acid. This quantity however must not be taken as the proportion of the acid in cream of tartar, for much of the weight of the crystallized acid is water of crystalli-

zation, whereas the cream of tartar contains very little water.

In the above detailed method of obtaining tartareous acid, chalk, or carbonate of lime, is used to decompose the cream of tartar, which it does merely by engaging the excess of acid, and leaving the remainder of the salt in the state of tartrate of potash. But if quick-lime be substituted to the chalk, the whole of the cream of tartar is decomposed, a much larger quantity of tartrate of lime, and consequently of tartareous acid, is obtained, and the supernatant liquor is a solution of caustic potash. It has been found however by Vauquelin, that the potash retains a small quantity of tartrate of lime in solution, so that when the alkaline liquor is evaporated nearly to dryness it gelatinizes by cooling, owing to the separation of this calcareous salt. It may be decomposed by carbonate of potash or soda, which produces carbonate of lime and tartrate of the alkali employed: or the tartareous acid may be destroyed by calcination, and the lime, carbonated in the process, will remain.

Calculating from the observed proportions of acid in the tartar, and of chalk required in the first-mentioned process, and of pure lime in chalk, we may estimate that all the acid in 100 parts of cream of tartar (which Thenard reckons at 57 per cent.) will require full 42 parts of pure lime for its saturation, and somewhat more lime should perhaps be added to ensure the complete decomposition of the tartar. The lime should be previously slaked and mixed with sufficient water to bring it to the consistence of paste.

Lowitz has proposed another method, which is perhaps preferable in every respect, except that it is somewhat more expensive, and that no caustic alkali is obtained. It consists first in decomposing the cream of tartar by chalk in the usual way, added as long as any effervescence takes place; and then pouring into the filtered supernatant liquor muriate of lime, as long as any precipitate falls down. By this means the tartrate of potash in liquor is totally decomposed, muriate of potash remains in solution, and the precipitated tartrate of lime is added to that produced by the chalk; and both are afterwards decomposed by sulphuric acid in the usual way. The same chemist also advises to add to the solution of tartareous acid in the last part of the process a quantity of charcoal powder, (the depurating power of which has been mentioned under CARBON.) This, however, is certainly not essential to the obtaining a perfectly fine colourless crystallized acid, and, we believe, is seldom, if ever, used.

The tartareous acid has a strong acid taste, and is soluble in five or six parts of water, and in a much less quantity of boiling water. The crystals are permanent in the air.

When heated *per se* in a retort with a receiver, this acid melts, boils up, and exhales a four pungent vapour, which condenses in the receiver into a red acid empyreumatic liquor, equal to about a quarter of the weight of the tartareous acid.

This liquor has a pungent, acid, and empyreumatic taste, strongly reddens litmus, and effervesces with the alkaline carbonates. It is called the Pyrotartareous acid, which has not been much examined. The other products from the distillation of tartareous acid, are a large quantity of carbonated hydrogen and carbonic acid gas, and a soft spongy coal is left in the retort, which, heated in the open air, burns with scarcely any residue.

The tartareous acid, besides being found native in some vegetable juices, and in the deposit from wine during and after fermentation, is also produced by the action of nitric acid on alcohol. A further digestion of tartareous with nitric acid converts the former into oxalic acid, and a still

further digestion changes the whole of the vegetable acid into vinegar. These curious experiments, which were at first noticed by Scheele, have been fully examined by Hermbstaedt, and other chemists.

Tartareous acid is composed, according to Fourcroy and Vauquelin, of 70.5 of oxygen, 19 of carbon, and 10.5 of hydrogen, and differs from the oxalic acid in containing more carbon and less oxygen. The order of affinity of this acid for the several bases is, according to Thenard, lime, barytes, strontian, potash, soda, ammonia, magnesia, and alumine. Aikin's Dict.

For the combinations of the tartareous acid with the several bases, we refer to the article TARTRATES or TARTRITES.

TARTARHAN, a word used by some authors to express spirit of tartar.

TARTARI, in *Geography*, a mountain of Dalmatia; 8 miles N. of Trau.

TARTARIAN OAT, in *Agriculture*. See OAT.

TARTARIZATUS CHALYBS. See IRON, in the *Materia Medica*, and TARTRITE of Potash and Iron.

TARTARIZING, a term used by some writers for the act of refining or purifying, by means of salt of tartar.

TARTARO, in *Geography*, a river of Italy, which rises in the Veronese, and running easterly, traverses the Polese de Rovigo, passes by Adria, and soon after separates into two branches, one of which runs into the Adige, and the other into the Po.

TARTARON, a sort of fine cloth or silk, mentioned in the stat. 4 Hen. VIII. c. 6. Blount, Cowel.

TARTARUGA, in *Zoology*, a name by which the Portuguese in America call a species of tortoise, known among authors by its Brazilian name *jurucua*.

TARTARUM TARTARISATUM, *tartarified tartar*, in *Chemistry*, the name of a preparation of tartar; the manner of doing which is given by Boerhaave, and is as follows: Reduce some of the purest white tartar to powder, and boil this powder in ten times its weight of water in a large copper vessel, till it appears perfectly dissolved: let it after this continue boiling till the liquor becomes tolerably transparent, and of an acid taste; then drop into it from on high oil of tartar *per deliquium*, the liquor being still kept boiling: upon the falling in of each drop there arises a great ebullition, occasioned by the meeting of the acid and alkali. Large bubbles appear on this, and in these the chemists have imagined they found the figures of clusters of grapes.

The operation is to be patiently continued till there is no more effervescence made by the falling in of the drops of the oil. The acidity of the tartar will be then so perfectly saturated with its own alkali, that it will appear neither acid nor alkaline, but a third salt; great caution however must be used in observing the true point of saturation, otherwise the salt will be when finished either a little acid, or a little alkaline, as the one or the other exceeds. The liquor is to be then strained several times through a flannel, till perfectly clear: it is of a deep brownish colour, and brackish saline taste, but has no scent. If this be evaporated to a pellicle, and set to crystallize, it forms a salt which is a tartar, easily soluble in water, even when cold; and very properly to be called soluble tartar. Boerhaave Chem. part ii. p. 161.

TARTARUS, in *Ancient Mythology*, is one of the general divisions of the subterraneous world, or the place of torments. The origin of the fable of Tartarus is traced in Hesiod's account of the war of Jupiter against his father Saturn and the Titans, who, after he had gained a victory over them, was driven from Olympus, and condemned to the bottom of Tartarus, in the extremities of the earth. Typhon also, threatening to deprive Jupiter of his empire,

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was plunged into the same abyss. The abbé Banier has given the following explication of this fable. The Greeks, he says, regarded the places situated to the east of them as higher than those that lay westward; and hence they took the former for heaven, and the latter for hell. According to this notion, they placed their hell either in Spain, the residence of Pluto, or in Italy, and lastly in Epirus, or rather in Thesprotia, all which countries were situated to the west of Greece. Now as the Titans, in the several conspiracies they formed, were obliged to enter into Italy and Spain, the poets fabled that they were precipitated into the gulf of Tartarus; but as their notion of Tartarus was taken from Tartessus, a river of Spain, on the banks of which Pluto resided, it is no wonder that the Titans, having been defeated near that river, were fabulously said to be plunged headlong into the Tartarian gulf.

The other two divisions of Ades, according to Virgil, are Erebus and Elysiun. The prince or judge who presides over Tartarus, is Rhadamanthus. The miserable inhabitants of this horrid region are of two sorts, *viz.* the souls of such as are tormented, and the infernal deities, called the Furies, who attend there either to inflict or aggravate their torments.

Virgil distinguished those that are tormented in Tartarus, into two general classes; the first, of such as have been ungrateful or impious towards the gods; and the second, of such as have been mischievous and hurtful among men: those of the latter, more particularly, who hated their brethren, used their parents ill, or cheated their dependents; who made no use of their riches; who committed incest, or disturbed the marriage union of others; those who were rebellious subjects, or knavish servants; who were despisers of justice, and betrayers of their country; and who made and unmade laws, not for the good of the public, but only to get money for themselves. All these, and the despisers of the gods, of whom the rebel giants occupied the chief class, Virgil places in Tartarus, and in that vast abyss, which was the most terrible part of this infernal region. The great road that passes through Erebus, is represented as divided into two; of which the right-hand road leads to Elysiun, or the place of the blest; and the left-hand road to Tartarus, or the place of the tormented. Virgil *Æn.* vi. v. 540—549. 566—580. 607—624. Spence's *Polymetis*, p. 259, &c.

TARTARS, or TATARS, in *Geography*, a comprehensive denomination, including all tribes beyond Persia and India, as far as the Eastern ocean, however differing from each other in regard to their origin, language, manners, customs, and religion. It is now known, however, that the Tartars compose a distinct nation, which originally belonged to the grand Turkish stock. The name, it is said, may originate either from a Turkish horde, which bore this denomination; and accordingly it is alleged, that the Yakutes have among their deities, a Tatar, who probably enjoys that honour as the patriarch of the nation; or from the Chinese, who call all their neighbours, without distinction, Tata or Ta-dse, in proof of which derivation it is intimated, that the Persians and Arabians know nothing of the Tartars under that appellation. It was first brought into general use in Europe after Baaty's incursion into Hungary, under king Frederic II. Whatever be the origin of the name, it seems to be clear, that the Tartars are of Turkish origin, and that their proper name was Turk or Turkman, and not Tatar. In this opinion, the learned men of their own nation concur: to which circumstance it may be added, that the Tartarian language is merely the old Turkish; and the modern Ottoman Turks speak the Tartarian tongue only in another dialect. And the Tartars pretend to derive their descent

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from Turk, the oldest son of Japhet: and although from the time in which Jenghis Khan subdued all Tartary and a great part of Asia, and made irruptions even into Europe, they have been known by the name of Tartars, to which that of Monguls or Moguls, of whom he was properly the prince, appears inferior; nevertheless the Tartars preserve among themselves the name of Turks. See MONGOLS.

The first known mother-country of the Turks or Tartars lies somewhere in the countries on the eastern and northern sides of the Caspian, where their descendants are still situated. In ancient times they were spread from the Oxus or Gihon into the Mongoley and the Orenburg territory; that is, in regions where they had constantly ambitious and domineering nations for their neighbours and enemies: on the E. the Chinese; on the S.W. the Persians, Macedonians, Romans, Partho-Persians, and Arabians; and towards the N.E. the Mongoles. Here they served from time immemorial as a mound against the incursions of the nations which could penetrate from the E. to the W., or contrariwise, till at length the Mongoles, like a rushing stream that has burst its banks, swept away all opposition.

The Tartars, says baron de Tott, in his "Memoirs," (vol. i.) have the best title to the highest antiquity. To this purpose he observes, that the flat high land of Tartary, which extends to the north, and the chain of the mountains of Caucasus and Thibet, continued almost as far as the peninsula of Corea, (if we may judge by the course of the water, which, from the centre of Asia, spreads to the S. and to the N. of that part of the globe,) present the highest portion of land which separates the Indian seas from those of Kamtschatka. This observation, it is alleged, seems to prove, that the country at present occupied by the Tartars, must have been the first land discovered in Asia, the first inhabited, the first source of population, and the origin of those emigrations, which, constantly repelled by the Chinese wall, and the dfiles of Thibet and Caucasus, have passed from the north of Asia into Europe. (See HUNS.) However, the annals of the Tartars are involved in considerable uncertainty before the time of Jenghis Khan, who was elected grand cham (khan) by the chams of the different tribes, and was only chosen to be the king of kings, because he was the most powerful among them. It is well known, that Jenghis Khan conceived and executed projects of usurpation, by which he formed the most extensive empire known in history.

The Tartars began to acquire some importance in history, after the time of their subjugation by the Mongoles; but from the moment that their history excites attention, it ceases to be the history of a peculiar nation. Distributed under the banners and commanders of the Mongoles, these enjoy with posterity the glory of their conquests, while the Tartars are constrained to lend their name to the devastations with which both nations every where marked the bloody progress of their armies. (See MONGOLS.) Subjugated in their conquered countries, and even forced from a great part of their old habitations, some few of the Tartar hordes (few in reference to the whole Tartarian tribes,) have preserved their independence: *i. e.* those who inhabit the south-western part of the former Great Tartary, towards the Persian, Indian, and Soongarian borders. Here we find the great Kirghistan horde, the Bukharians, the Khivans or Khivians, the Karakalpaks, Truchimmes, Tschikantians, Turkestans, Arabians, and some other races, which still form distinct states, and retain a kind of national liberty; but they exist in so feeble a state, that they are obliged to seek protection sometimes from one power, and sometimes from another. The whole remnant of this nation, once so

great, subsists under foreign sovereignty. Many hordes belong, either as subjects or as dependent wards of the Russian empire; others are, in like manner, appanages to the Ottoman Turks, or subject to the Great Mogul, to China, and to Persia.

Mr. Strahlenburg, a Swedish officer, who resided some years in Siberia, places them in six classes: the first, containing seven different nations, all in the dominions of Russia, *viz.* the Mordvines, who dwell in the government of Nizgorod; the Tschermishes, or Czeremishes, in the government of Kazan; the Permians, in the government of Perm; the Votiaks, in the government of Viatka; the Vogouls, who dwell on both sides of the mountains, which formed a separation between Russia and Siberia; the Ostiaks, who dwell on the coasts of the river Oby; and the Barabintzi, who inhabit the country between Tara and Tomsk. The second class of people, called Tartars, includes the Budziaks, which dwell on the coasts of the Black sea; the Crim Tartars, who inhabit the province of Taurida; the Kuban Tartars, on the borders of the Kuban river; and the Tartars of Daghestan; the Nogais, or Tartars of Astrachan, of Kazan, and Upha; the Baschkirs and the Tartars about the towns of Tiumen, Tara, Tobolsk, and Tomsk; the Usbeck Tartars, the Turcomans, the Kurguis, the Karakalpaks, the Sayantzi, who dwell near the head of the Yenissey; the Kirghises, who occupy the mountains south of lake Baikal; the Burats; the Arintzi, who also inhabit near the same mountain; and the Yaktai, more to the north, on the sides of the Lena. The third class includes the Samoiedes, on the coast of the Frozen sea, from Archangel to the Lena. The fourth class includes the Kalmucks and Monguls, who were formerly but one people. The fifth class includes the Mantcheux and the Tunguses. The sixth class contains the savage nations on the north-east coast of Asia, as the Tschutki, &c. with the inhabitants of Kamtschatka, and the Kurile islands. Of these, the first, third, and sixth class are subject to Russia, except that a small part of the second is independent. The fourth is partly independent, and partly subject to China. The fifth class is wholly subject to China.

Abulgasi, in his account of the Turkish stems, mentions among them the Tartarian as one of the most ancient and famous, and derives its origin from a khan of the name of Tatar. This stem, which in process of time increased to 70,000 families, was at first governed by its own commander, and afterwards divided into various branches, dispersed into several and very distant regions, by which dispersion their power was weakened. The most considerable branch settled on the borders of Kitay (China), and fell under the sovereignty of that empire, against which it frequently rebelled, and thereby gave occasion to ruinous wars. At the time of Jenghis Khan, some Tartars dwelt on the Oxus or Amur, who were tributary to the emperor of Kin, reigning in Kitay.

The Tartars who belong to the Russian empire inhabit the northern coasts of the Euxine and the Caspian, the north side of the mountains of Caucasus, the extensive steppes from the river Ural to the Soongarey, the southern Ural, in Siberia the southern frontier mountains and steppes from the Tobol quite over the Yenissey, and the deserts in the middle region of the Lena; and some few Tartar colonies are dispersed among the Russian habitations, particularly in the governments of Upha, Kazan, and Tobolsk. Frequent memorials are found in various regions of their ancient grandeur, magnificence, and culture, some of which are demonstrably of 1000 years' antiquity. The branches of this nation which belong to Russia are the proper Tartars, or the descendants

descendants of those two great states, which the successors of Jenghis erected on the Volga and in Siberia (see KAPTSCHEK, and the sequel of the article); the Nogayans, the Meschtscheryaks, the Baschkirs, the Kirghises, the Bucharians, the Yakutes, the Teleutes, and in part the tribes of Caucasus. The Kaptschak Tartars are reduced to a small residue, intermixed among the Baschkirs and Kirghises. The Kazan Tartars are also a feeble remnant of what they formerly were, and are dispersed in the governments of Kazan, Simbirsk, Riefen, Viatka, Perm, and Upha. The Astrachan Tartars are for the most part Nogayans: they are distinguished into town, village, and tent Tartars. The first dwell in Astrachan, the second in six villages near Astrachan, and the third wander about the Caspian. In 1772, those of the two former classes were only 1200, and of the tent Tartars scarcely 2000 kettles, or families. For the state of the Krim Tartars, see CRIMEA. The stems of the Siberian Tartars, who are numerous, are the Turalinzes, one of the first colonies that became permanent in Siberia, when the Tartars subjugated the country in the 13th century; the Tobolskian Tartars, who dwell on the river Tobol; the Tomskian Tartars, who inhabit both sides of the river Tom, above and below the city of Tomsk; the Krasnoyarskian and Kufnetzian Tartars; the Tartars of the Oby; the Tschulymskian Tartars, inhabiting the territory along the river Tschulumy; the Barabinzes, between the Oby and Irtysh; the Katschinzes, on the left shore of the Yenissey; the Kistim and Tulibert Tartars, on the left bank of the Tom; the Biriusses; the Abintzes; the Sayane Tartars; the Beltirs, the Verchotomskian Tartars, and some other insignificant stems. For the other branches of the Tartars who inhabit Russia, we refer to the several articles, NOGAYANS, &c. &c.

The Tartars who are Mahometans bordering on Russia, but independent of that crown, take every opportunity of robbing their neighbours: the Kalmucks and Monguls are very different in their behaviour, living quietly on the produce of their soil, without doing injury to others. The Tartars of Asiatic Russia are likewise represented as a quiet, inoffensive people, living chiefly by the chase and fishing. See the following articles. See also MANDSHURS, MONGOLES, TUNGUSES, &c.

TARTARY, or TATARY, a vague name, as it relates to Asiatic Russia, which cannot be used with precision as descriptive of any particular country: instead of it might therefore be substituted names derived from the seats of the chief nations, as Tungusia or Mandshuria in the east, Mongolia in the centre, and Tataria in the west. In a general sense, however, whilst the name remains, it may include three distinct countries, *viz.* Chinese Tartary, Independent Tartary, and Russian Tartary.

TARTARY, *Chinese*, according to the abbé Grosier's description, is bounded on the north by Siberia, on the east by the gulf of Kamtschatka and the Eastern sea, on the south by China, and on the west by the country of the Kalmucks, who are established between the Caspian sea and Kashgar. The different tribes which at present inhabit it, were formerly comprehended under the general name of Mongul or Mogul Tartars, a warlike and formidable nation, who, on the one hand, conquered Hindoostan, under the famous Jenghis Khan, and on the other, subdued China. It was in the 13th century that the Monguls took possession of the latter empire; but after having reigned there for 100 years, they were expelled by the Chinese, in the year 1368. The fugitives took different routes; some went towards the Eastern sea, and established themselves between China and the river Saghalien; the rest returned westward to their former country, where, intermixing with the Monguls that remained,

they soon resumed their ancient manner of living; those who settled towards the east, having found the country almost a desert, and without inhabitants, retained the same customs which they had brought from China: hence these two Mongul nations differ at present in language, government, religion, and customs. Those of the east retain their ancient name of Mongul, or Mogul Tartars; the rest are known by the name of Mantchew, or Eastern Tartars. Chinese Tartary is therefore divided into two parts, the Eastern and Western. Eastern Chinese Tartary extends, north and south, from the 41st to the 55th degree of north latitude; and east and west, from about the 120th degree of longitude, as far as the Eastern sea. It is bounded on the north by Siberia, on the south by the gulf of Leao-tong and Corea, on the east by the Eastern sea, and on the west by the country of the Monguls. The Tartars who retired hither, after their expulsion from China, in the year 1368, immediately began to build cities, towns, and villages, and to cultivate the earth, after the manner of the Chinese, among whom they had lived: hence the greater part of them have remained fixed, and are much more civilized than the rest of the Mongul nation. They were at first governed by particular khans, each independent of the other; but since that of Ningouta (who was the most powerful among them) took possession of China, about the middle of the 17th century; the emperor, who is still one of his descendants, has reduced under his dominion all the other khans of this part of Tartary: this prince governs it immediately by himself, and sends thither governors and officers, as into all the other provinces of the empire. The country of the Mantchew Tartars is divided into three grand departments: *Chen-yang*, *Kirin*, and *Téücar*; which see respectively.

Ningouta, already mentioned, which is considered as the cradle of the present imperial family, is surrounded by a wooden wall, consisting of stakes, touching each other and twenty feet high, and also another palisado without this, a league in circumference, and having four gates, corresponding to the four cardinal points. The Mantchew Tartar, who resides in it as lieutenant-general, extends his jurisdiction over the adjacent country, and all the villages of Yüpi-tafe, and some other petty nations that inhabit the banks of the rivers Oufouri and Saghalien, and along the sea-coast. The Tartars of Yüpi-tafe are peaceful in their disposition, but stupid and clownish, without letters, and without any religious worship. They sow neither wheat nor rice, nor any thing else except tobacco, which they cultivate in some of the fields surrounding their villages. They are supplied with fish from the river Oufouri, and this is their only food: nor have they any clothes besides those which they make of their skins, dressed, dyed of three or four colours, and artfully sewn together with a thread cut from an exceedingly fine skin. The women suspend from the bottoms of their long cloaks pieces of money and little bells; and the tresses of their hair, which hang over their shoulders, are loaded with small mirrors, rings, and other toys. Of one part of their fish, which they employ the summer in taking with harpoons and small nets, they make oil for their lamps; another supplies them with food; and a third part is reserved for winter, when the ice prevents them from fishing. Beyond the Yüpi-tafe Tartars are the Ketcheng-tafe Tartars, who inhabit both banks of the river *Saghalien-nula* (which see), and extend as far as the Eastern sea. These Tartars are less clownish than the preceding, and employ much of their time in hunting fables.

The Mantchews, dispersed throughout Eastern Chinese Tartary, have neither temples nor idols; they adore (as they express it) only the "emperor of heaven," to whom they

## TARTARY.

offer sacrifices: but since they have entered China, some of them worship the god "Fo," and other idols revered in the empire. When they became masters of China, they pretended to a celestial extraction, and placed a god at the head of their race. Since the Tartars have had possession of the throne of China (see CHINA), their language has become familiar at the court of Pe-king. This language they are very careful in preserving, and it is said that it may be much more easily acquired than that of China. Although the Tartars have only one kind of characters, they write them in four different ways, which they write with a pencil, or a kind of pen, formed of the bamboo reed, and which they can read with equal ease when reversed.

TARTARY, *Western Chinese*, is called also the country of the Mongoles, or Moguls; for an account of which, see the article MONGOLES. See also KALKAS, KALMUCKS, and KOKONON. We shall here add that the country of the Ortous, who inhabit N. of the great wall, and W. of the Moguls properly so called, is 110 leagues in extent from E. to W., and 70 from N. to S. These people are divided into six standards, which comprehend 166 companies, each composed of 150 heads of families. The Ortous are of a free disposition, very lively, and never subject to melancholy, and may be justly called the "French of Tartary."

Wild animals of various kinds are innumerable in the plains and forests of Tartary. The country abounds with game, and all the animals that are hunted in Europe, with large flocks of yellow goats, wild mules, wild camels, and horses; an animal resembling the elk, a species of lynx, whose skin is highly valued, tigers of prodigious size and agility, whose skins are used for ornament; a species of leopard, and stags. Some of their rivers wash down gold mixed with their sands; and they are acquainted with the method of applying it to use, and of forming it into vases and small statues, of which they often make offerings to their idols. It appears that the use of gold is very ancient among them.

The vulgar name of Tartary, or Tatar, says Mr. Pinkerton, was originally extended over the vast regions lying between Thibet, China, and the Arctic ocean; and from the Black sea in the west to the utmost bounds of north-eastern discovery in Asia. But as geographical knowledge has improved, the northern part has acquired the name of Siberia, while the southern is distinguished by the appellation of Western and Eastern Tartary. But in this part, which might more properly be named Central Asia, the Tartars, properly so denominated, are few, the most numerous tribes being Monguls in the west and Mandshurs in the east. See MONGOLES and MANDSHURS.

The wide and interesting portion of Asia, formerly known by the appellation of Eastern and Western Tartary, but now properly styled Central Asia, and comprehending the Middle Mongolia and the Eastern Mandshuria, which has repeatedly sent forth its swarms to deluge the arts and civilization of Europe, says the geographer above cited, extends from E. long. 72° to 145°, a space of not less than 73° of longitude, which, at the medial latitude of 45°, will yield about 3100 geographical miles. The breadth from the northern frontier of Thibet to the Russian confines, is about 18°, or 1080 geographical miles. The limit between Russia and Chinese Tartary is partly an ideal line, and partly the river Argoon, which joined with the Onon, constitute the great river Amur. From the treaty published by Du Halde it appears, that the river Kerbatchi, the nearest to the river Chorna or Ourouon, and which discharges itself into the great river Saghalien-oula, was the Chinese definition of the boundary between the two empires, to which was added the long

chain of mountains above the source of the river Kerbatchi and the river Argoon. The eastern boundary is the sea, while the southern extends along the great Chinese wall, and the northern limits of Thibet. The western boundary is supplied by the celebrated mountains of Belur-Tag, or the Cloudy Mountains, which divide the Chinese empire from Balk, and the greater Bucharia; while the range on the W. of the lake Palkati separates the Kalmucks, subject to China, from the Kirguses of Independent Tartary.

The original population of Central Asia appears to have been indigenous. The west was partly held by the ancient Scythæ, seemingly a Gothic race, who were subdued or expelled by the Tatars, or Huns, from the east, pressed on the other side by the Monguls, beyond whom were the Mantchews, who, in the 17th century, conquered China. Pinkerton's Geography, vol. ii. See MONGOLES and MANDSHURS.

TARTARY, *Independent*, an extensive, celebrated, and interesting region, considered as distinct from Mongolia and Mandshuria, or as these countries have been less properly called, Chinese Tartary, and independent of the great neighbouring powers, China, Russia, and Persia: this country was probably the seat of the most ancient Persian kingdom, the possession of the Greek monarchs of Bactriana, and after many revolutions, distinguished by the wide empire of Jenghis or Zingis, and Timur. Its extent may be measured from the Caspian sea to the mountains of Belur, a space of about 870 British miles. From the mountains of Gaur in the S., to the Russian boundaries in the N. of the desert of Issim, it may be near 1500 British miles, of which a great part is desert. The chief divisions are the wide steppes, or barren plains in the N., held by three hordes of Kirguses or Kirghises, the Great, Middle, and Lesser, besides some small Tataric tribes near the sea of Aral. This portion was anciently called Turkestan, and its capital was Taraz. (See both these articles.) Southwards of the mountains of Argun, the land begins to become fertile along the river Sirr or Jaxartes, called also the river of Shush from the chief territory, and also on the banks of its tributary streams. Ilak and Shush, the most northern provinces on the Siron, are followed by Fergana, and a district called Ozrusna, round a town of the same name. Divided from these provinces by deserts and mountains is the kingdom of Kharism, or Kharasm, which see. South of the range of the Ak Tam is the fertile region of Sogd, or Sogdiana, with its capital Samarcand. On the S., the provinces of Balk, Kilan, Tokarestan, and Gaur, terminate the bounds of Independent Tartary, here separated by deserts on the W. from the Persian province of Chorasan or Khorassan. See these articles respectively. See also BELUR-TAG, BUCHARIA, IMAUS, KIRGHISES, MASSAGETÆ, SCYTHIA, and UZBECKS.

TARTARY, *Crim.* See CRIMEA.

TARTARY, *Russian.* See RUSSIA and TARTARS.

TARTARY, *Little*, a name that has been given by some writers to the country containing the peninsula of the Crimea, the Kuban, a part of Circassia, and all the lands which separate the empire of Russia from the Black sea. This circuit, continued from Moldavia almost to Taganrog, between the 44th and 46th degrees of latitude, is from 30 to 40 leagues wide, and nearly 200 long. From E. to W. it includes Yetitchoolai, Dgamboylask, Yedefan, and Bessarabia. The latter province, at present called Boodjak, is inhabited by Tartars, who, as well as those of the peninsula, have fixed habitations in their villages; but the inhabitants of the three other provinces have only felt-tents, which they carry wherever they please. Those people, called Noguais, and supposed to be Nomades, are settled, however, in the vallies that traverse their plains from N. to S.,

and their tents, ranged in a single line, form thus a kind of villages of 30 and 35 leagues in length, which distinguish the different hordes. Tott's Memoirs, vol. i. See CRIMEA and RUSSIA.

TARTAS, a town of France, in the department of the Landes, and chief place of a canton, in the district of Saint-Séver, divided into two parts, the first containing 1556, and its canton 6154 inhabitants, and 8 communes; and the second part containing 1656, and its canton 7952 inhabitants, and 12 communes: its whole territorial extent being 540 kilometres; 15 miles W.S.W. of Mont-de-Marfans. N. lat. 43° 50'. W. long. 0° 44'.—Also, a river of Russia, which runs into the Om, near Tartaskoi.

TARTASKOI, a town of Russia, in the government of Tobolsk, at the union of the Om and the Tartas; 40 miles W.S.W. of Kainfk.

TARTESSUS, in *Ancient Geography*, a town of Spain, in the part called Bœtica, situated between the two arms by which the river Bœtis discharged itself into the sea. One of these arms has disappeared, and the other still subsists and passes into the sea at San Lucan de Barrameda. Some geographers have suggested that Gades was the ancient Tartessus. Strabo intimates that anciently the river Bœtis was called Tartessus, and that the town of this name was afterwards called Cartheia. M. d'Anville gives the name of Tartessus to the island formed by the two branches of the Bœtis at its mouth.—Also, a mountain of Spain, in Bœtica.

TARTESSUS, *Isle of*, was situated near Gades, and is supposed to have been the Tarshish of the Phœnicians, to whom it was known about 1000 years B. C.

TARTI LAPIS, a stone mentioned by Ludovicus Dulcis, and some other authors, and said to be very beautiful, having all the colours of the tail of a peacock, and to have many medicinal virtues. It was probably some species of agate; but the short account given of it will not enable us to guess what particular kind.

TARTINI, GIUSEPPE, of Padua, in *Biography*, the greatest performer on the violin and composer for that instrument of the last century. We shall here only consider him as a practical musician, though he has distinguished himself as a theorist in a way superior to all other contemporary professors. See SYSTEM, and STILLINGFLEET.

This admirable musician and worthy man was born at Pirano, in Istria, in 1692. His father, having been a great benefactor to the cathedral church at Parenzo, had been ennobled in reward for his piety. Giuseppe was intended for the law, but mixing music with his other studies during the course of his education, it soon grew too powerful for the rest, and tyrannized over the whole circle of sister sciences. This is not so surprising as another strong propensity, which during his youth occupied his attention very much, which was *fencing*, an art that was not likely to become necessary to the safety or honour of a man of so pious and pacific a disposition, in a civil employment; and yet he is said to have equalled in this art even the master from whom he received instructions. In 1710 he was sent to the university of Padua to pursue his studies as a civilian; but before he was twenty, having married without the consent of his parents, they wholly abandoned him, and obliged him to wander about in search of an asylum; which, after many hardships, he found in a convent at Assisi, where he was received by a monk his relation, who, commiserating his misfortunes, let him remain there till something better could be done for him. Here he practised the violin, to keep off melancholy reflections; but being discovered on a great festival in the orchestra of the church of the convent by the accident of a remarkable high wind, which forcing

open the doors of the church, blew aside the curtain of the orchestra, and exposed all the performers to the sight of the congregation; when, being recognized by a Paduan acquaintance, differences were accommodated, and he settled with his wife at Venice for some time. This lady, indeed, was of the Xantippe kind, and being himself very Socratic in wisdom, virtue, and patience, her reign was unmoested by any domestic war, or opposition to her supremacy.

While he was at Venice, the celebrated Veracini arrived in that city, whose performance awakened an extraordinary emulation in Tartini, who, though he had been thought to have a powerful hand, had never heard a great player before, or conceived it possible for the bow to have such varied powers of energy and expression. He, therefore, quitted Venice the next day, and went to Ancona, in order to study the use of the bow in more tranquillity, and with more convenience than at Venice, as he had a place assigned him in the opera orchestra of that city.

This happened in the year 1714, the year in which he discovered the phenomenon of the third sound. It was at Ancona, and in the carnival of the same year, that he heard and perceived the extraordinary effects of a piece of simple recitative, which he mentions in his "Trattato di Musica." (See RECITATIVE.) It was likewise during his residence at Ancona, that, by diligent study and practice, he acquired sufficient abilities and reputation to be invited, in 1721, to the place of first violin, and master of the band in the celebrated church of St. Anthony of Padua.

By this time his fame was so extended, that he had repeated invitations from Paris and London to visit those capitals; but by a singular devotion and attachment to his patron saint, to whom he consecrated himself and his instrument, he declined entering into any other service.

Before the year 1728, he had made many excellent scholars, and formed a school, or method of practice, for the students on the violin, that was celebrated all over Europe, and which increased in fame to the end of his life.

The author of the compendium of his life informs us that his first book of solos was engraved at Amsterdam, 1734; the second at Rome, 1745; and that he produced above two hundred of these compositions, which were handed about in manuscript by the curious; but does not seem to know that nine or ten books of Tartini's solos were printed at Paris, of which we are in possession of opera third, sixth, seventh, and ninth, besides the two books printed in England, amounting to upwards of fifty solos, exclusive of manuscripts.

Of his concertos, which likewise amount to two hundred, this author gives a very unsatisfactory account; he says, that a surreptitious copy of two sets having first appeared in Holland, he would never own them. The first six seem to have been composed in his first manner before he changed his style. But Walther tells us, in 1732, that eighteen of his concertos for five instruments, principal violin, two ripieno violins, tenor, and violoncello, were published at Amsterdam. But Le Cene, the publisher, confessed, that he collected them from different people who had obtained copies from the author, and there seems not the least doubt of their being genuine.

Though Tartini's compositions always afforded us great pleasure, and were never obliterated from our memory; yet as they are now as much laid aside as those of Bassani or Locatelli, we thought it right to give them a revision before we ventured our sentiments concerning their merit.

Tartini, on a recent examination of his works, seems, to our conception and feelings, to have had a larger portion of genius and knowledge of composition as a mere instrumental composer,

compoſer, than any other author who flouriſhed during the firſt fifty or ſixty years of the laſt century. Though he made Corelli his model in the purity of his harmony, and ſimplicity of his modulation, he greatly ſurpaſſed that compoſer in the fertility and originality of his invention; not only in the ſubjects of his melodies, but in the truly cantabile manner of treating them. Many of his adagios want nothing but words to be excellent pathetic opera ſongs. His allegros are ſometimes difficult; but the paſſages fairly belong to the inſtrument for which they were compoſed, and were ſuggeſted by his conſummate knowledge of the finger-board, and powers of the bow. He certainly repeats his paſſages, and adheres to his original *motivo*, or theme, too much, for the favourite deſultory ſtyle of the preſent times; but it muſt be allowed that by his delicate ſelection and arrangement of notes, his paſſages are always good; play them quick, or play them ſlow, they never ſeem unmeaning or fortuitous.

Indeed, as a harmoniſt, he was perhaps more truly ſcientific than any other compoſer of his time, in the clearneſs, character, and preciſion of his baſes; which were never caſual, or the effect of habit or auricular prejudice and expectation, but learned, judicious, and certain. Yet, with all our partiality for his ſtyle, talents, and abilities, as well as veneration for his principles and character, we muſt, in juſtice to others, own, that though the adagio and ſolo playing in general of his ſcholars were exquisitely poliſhed and expreſſive, yet it ſeems as if that energy, fire, and freedom of bow, which modern ſymphoniſts and orchestra-playing require, were wanting. Perhaps the refinement of a Nardini and force of a Viotti are incompatible.

Since the time of Tartini, the productions of Boccherini, Haydn, Vanhal, Mozart, Pleyel, and others, have occaſioned ſuch a revolution in violin-muſic and playing, by the fertility and boldneſs of their invention, that compoſitions which were then generally thought full of ſpirit and fire, appear now totally tame and inſipid.

This admirable muſician and worthy man died the 26th of February, 1770, to the great regret of the inhabitants of the city of Padua, where he had reſided nearly fifty years, and where he was not only regarded as its chief and moſt attractive ornament, but philoſopher, ſaint, and ſage. He had no children.

M. de Lalande ſays, he had from his own mouth the following ſingular anecdote, which ſhews to what degree his imagination was inflamed by the genius of compoſition. "He dreamed one night, in 1713, that he had made a compact with the devil, who promiſed to be at his ſervice on all occaſions; and during this viſion every thing ſucceeded according to his mind; his wiſhes were prevented, and his deſires always ſurpaſſed by the aſſiſtance of his new ſervant. In ſhort, he imagined he gave the devil his violin, in order to diſcover what kind of a muſician he was; when, to his great aſtoniſhment, he heard him play a ſolo ſo ſingularly beautiful, and executed with ſuch ſuperior taſte and preciſion, that it ſurpaſſed all he had ever heard or conceived in his life. So great was his ſurpriſe, and ſo exquisite his delight upon this occaſion, that it deprived him of the power of breathing. He awoke with the violence of this ſenſation, and inſtantly ſeized his fiddle, in hopes of expreſſing what he had juſt heard, but in vain; he, however, then compoſed a piece, which is perhaps the beſt of all his works, (he called it the Devil's Sonata,) but it was ſo inferior to what his ſleep had produced, that he declared he ſhould have broken his inſtrument and abandoned muſic for ever, if he could have ſubſtituted by any other means."

He was one of the few compoſers of his time, who con-

ſtantly drew from his own ſource; his melody was full of fire and fancy, and his harmony, though learned, yet ſimple and pure; and as a performer, his ſlow movements evince his taſte and expreſſion, and his lively ones his great hand. He was the firſt who knew and taught the power of the bow; and his knowledge of the finger-board is proved by a thouſand beautiful paſſages, to which that alone could give birth. His ſcholar, Nardini, who played to us many of his beſt ſolos, as we thought, very well, with reſpect to correctneſs and expreſſion, aſſured us that his dear and honoured maſter, as he conſtantly called him, was as much ſuperior to himſelf in the performance of the ſame ſolos, both in the pathetic and brilliant parts, as he was to any one of his ſcholars.

Of his theoretical writings, we have had occaſion to ſpeak frequently and freely in former articles, particularly in our analysis of his SYSTEM, and Stillingfleet's Commentary. See STILLINGFLEET.

His practical works or compoſitions, always for his own inſtrument, the violin, conſiſt of twelve ſolos on Corelli's model, ſix with double ſtops and fugues, with ſix of a lighter kind, in ſingle ſtops, op. 1<sup>a</sup>, ſix ſolos, op. 2<sup>a</sup>, published by Walsh, about the year 1746, in a more free and original ſtyle. The firſt of theſe ſets, in E $\flat$ , which was Brown's "Cheval de Bataille," appeared more than ten years at every concert at which he performed a ſolo in London. Two ſets of concertos, in a very florid and difficult ſtyle, collected in MS. by travellers, and published in Holland by Le Cene and Witvogel without the author's permiſſion, he called in, and cancelled the plates. However, we procured a copy from Holland, that was printed after the plates were ſcratched. We ſcored ſeveral of them, and found more beautiful paſſages, more difficulties and knowledge of the finger-board, than in any other violin ſolo concertos which we had ever ſeen. Many ſets of beautiful ſolos were printed at Paris of his compoſition, which are wholly unknown in England. More than 200 of his violin concertos and ſolos were diſperſed over the continent in MS.; many of his unedited ſolos we procured from his favourite diſciple Nardini, at Florence, after his deceaſe. If the concertos which he compoſed for his own performance in the church of St. Antonio de Padua could be procured, they would probably be in a grave and eccleſiaſtical ſtyle, peculiarly ſuitable to the place and piety of the author.

TARTON RAIRE, in *Botany*, a name uſed by ſome authors for the heath-ſpurge, or that ſpecies of the thymelæa which is called *Jannamunda* in the catalogues of the *Materia Medica*.

TARTOOR, in *Geography*, a town of Hindooſtan, in the circar of Cicacole; 9 miles S. of Viſianagram.

TARTRATES, or TARTRITES, in *Chemistry*, ſalts formed by the combination of any baſe with the tartareous acid. Theſe ſalts are numerous; as with ſome the acid forms two ſalts, differing in the proportions of the acid and baſe, and alſo as it is liable to form triple ſalts in which two baſes are united with their reſpective portion of acid into one uniform compound. All the ſoluble alkaline and earthy tartrites, the latter being leſs ſoluble than the former, are decompoſed by the ſalts of lead, and the acid of all is deſtroyed by calcination, leaving the baſe in the ſtate of carbonate.

TARTRATE, *Super, of Potaſh*, is a combination of potaſh and tartareous acid in exceſs (whence its name), and to which it is owing that it has an acid taſte, and that it reddens blue vegetable colours. This is the *cream of tartar*, or *tartarum acidulum*, the nature and manufacture of which have been deſcribed under the article TARTAR. (See alſo *Super-tartrate of potaſh* under SALTS.) This ſalt is not ſoluble without great difficulty, requiring about 30 parts of boiling water,

water, and at least 120, or as others say 60 parts of cold water; and hence a hot saturated solution begins to deposit crystals almost immediately after it begins to cool. So great is the affinity between the tartareous acid and that proportion of potash which constitutes the super-tartrate, that the acid of tartar will, partially or wholly, decompose all the neutral salts of potash, even the sulphate. Nevertheless, the affinity between the super-tartrate and the additional quantity of potash necessary for the complete saturation of this acid is much weaker than that of most other acids for potash; and hence arises a great number of decompositions, when tartareous acid, potash, and any other acid are mixed in different ways. The property, which the tartareous acid possesses, of decomposing the neutral salts with the basis of potash, is very useful in analysis, as it serves to distinguish them at once from the corresponding salts of soda and ammonia, which are not decomposable in the same manner. By saturating the excess of acid in cream of tartar with the several bases (potash excepted) various triple salts are produced. Although some inconvenience attends the use of borax in adding the solution of *Cream of TARTAR* in water (see that article); yet simple boracic acid has the power of rendering soluble four times its weight of cream of tartar in only five or six parts of hot water, and, as it is suggested, without decomposing the tartar, since the affinity of the boracic acid for the several bases is remarkably weak.

If a solution of cream of tartar in water is exposed to the air for a length of time, it gradually becomes turbid, a number of mucous flocculi are deposited, and in the course of some months it ceases to be acidulous, after which it becomes sensibly alkaline to the taste and to chemical tests, and it is finally converted into a weak solution of carbonate of potash, the tartareous acid totally disappearing, and carbonic acid taking its place. Fire operates a more rapid destruction of the tartareous acid, for if cream of tartar is calcined in an open fire with a red heat, it first softens, blackens, becomes of a pasty consistence, the acid burns off with flame and smoke, and finally a white carbonate of potash is left. The alkali procured in this way is very pure, and is often obtained for the laboratory by moistening crude tartar or cream of tartar to the consistence of stiff paste, wrapping up small parcels of it in brown paper, and arranging them in a grate or furnace of any kind with charcoal, and kindling it. After the charcoal has burnt out, the tartar is converted into lumps of carbonate of potash, which still cohere, and may be readily picked out of the ashes of the charcoal. A very pure carbonate of potash may also be made by deflagrating in a red-hot crucible equal parts of nitre and cream of tartar.

This salt is composed, according to Thenard, of 57 *per cent.* of tartareous acid, and 33 of potash, the remaining 10 parts being chiefly water of crystallization. Of these 57 parts of acid, 20 are in excess, so that the composition of the salt may be stated, in a different manner, to be 70 *per cent.* of tartrate of potash, and 20 of tartareous acid.

Cream of tartar is decomposed by lime and barytes, and probably by strontian, and caustic potash is left in the solution.

*TARTRITE of Potash.* See *Soluble TARTAR*, and *Tartrate of Potash* under *SALTS*. This salt, consisting of tartareous acid and potash in mutual saturation, is most conveniently prepared by adding cream of tartar to a hot solution of carbonate of potash. During the effervescence, the addition of cream of tartar should be continued; when this ceases, the solution should be boiled down till a pellicle appears on the surface, and then left to crystallize by cooling. The tartrate of potash then separates, generally in the form of pa-

rallelopipeds, with dihedral summits. When the salt is prepared in a large way for medicinal purposes, the evaporation is continued nearly to dryness, with frequent stirring, by which the salt is obtained in a shapeless granular mass. This salt is partially decomposed by the stronger acids. Tartareous acid dropped into a moderately strong solution of tartrate of potash causes an immediate deposit of cream of tartar. For other particulars, see the articles above cited.

*TARTRITE of Potash and Soda*, a triple crystallizable salt, prepared by throwing into boiling water about a fifth of its weight of cream of tartar, and adding gradually a quantity of carbonate of soda, whilst any effervescence is excited; then evaporating the whole to the consistence of syrup. As it cools, the triple salt will be obtained in large beautiful transparent crystals, generally of the form of eight-sided prisms, and often divided longitudinally through the axis. This salt, which is perfectly neutral, dissolves in about five parts of water, and somewhat effloresces by being exposed to the air. Barytes and lime totally decompose it, and the supernatant liquor contains a mixture of potash and soda. According to Vauquelin, it is composed of about 54 *per cent.* of tartrate of potash and 46 of tartrate of soda. It is decomposed by the stronger acids, and yields cream of tartar. See *RUPELLIENSIS Sal*, and *SODA*.

*TARTRITE of Potash and Ammonia*, a triple salt prepared, in the same general manner as the preceding, by saturating cream of tartar with carbonate of ammonia, evaporating and cooling. Exposed to the air it effloresces, loses its ammonia, and returns to the state of simple cream of tartar.

*TARTRITE of Potash and Lime, Barytes, &c.* Between tartrate of potash and lime there exists a certain affinity, which tends to the formation of a triple salt, though lime will completely decompose any alkaline tartrate. Thus though simple tartrate of lime is insoluble in cold water, no precipitate is produced by the affusion of a small quantity of lime-water into a cold solution of tartrate of potash, which must therefore be owing to the tartrate of lime, then formed, being rendered soluble by the remaining tartrate or rather subtartrate of potash. Even when cream of tartar is as completely as possible decomposed by lime in substance, in the process of obtaining the acid, the caustic alkaline liquor, supernatant over the precipitated tartrate of lime, still holds a small quantity of the latter in solution, as has been remarked by Vauquelin, which may be considered as a triple salt of tartareous acid, lime, and potash, the latter being in very large excess.

The same applies to barytes and strontian, the solutions of which do not immediately give a precipitate with tartrate of potash; and even if tartrate of barytes or of strontian recently formed and still wet be put into a solution of tartrate of potash, it is soon dissolved; though the mere quantity of liquid present would be entirely unable to effect a solution. There is therefore such a strong affinity between tartrate of potash and these earthy tartrites, as may perhaps entitle us to consider these compound solutions as triple salts, though they have not been obtained in a crystallized form like the triple tartrate of potash and soda.

Alumina unites with still greater ease with tartrate of potash: for when this earth, recently precipitated from alum by a caustic or carbonated alkali, and still wet, is transferred to a solution of tartrate of potash, it readily dissolves therein, and forms an uncrystallizable compound, which is not rendered turbid by any addition of potash or its carbonate. The Rochelle salt has the same habitude with alumina as the simple tartrate of potash, which therefore forms a quadruple compound of tartareous acid, potash, soda and alumina. See *ALUMINE*.

**TARTRITE of Soda**, a salt produced in small needled crystals from a due evaporation of tartareous acid saturated with soda. This salt, formerly confounded with the Rochelle salt, or *sal Rupellensis*, is not very soluble in water; however, when tartrate of potash is added to this salt, each in saturated solution, large crystals of the triple tartrate, or Rochelle salt, are immediately deposited.

A *super-tartrate of soda* is formed by partially saturating tartareous acid with soda, and also by adding a strong acid to the saturated tartrate, which, being less soluble than the saturated compound, precipitates. It is observed, however, that tartareous acid will not form (visibly) an acidulous tartrate, when added to the sulphate and other salts of soda, as it will do with the salts of potash.

**TARTRITE of Ammonia**, a salt formed by saturating the tartareous acid with ammonia or its carbonate. This salt crystallizes readily, and is decomposed by the fixed alkalies and alkaline earths.

A *super-tartrate of ammonia* is formed in a similar manner to the super-tartrate of soda, and with the same exception of the acid not visibly decomposing the other ammoniacal salts. See **AMMONIA**, and *Tartrate of Ammonia* under **SALTS**.

**TARTRITES, Earthy**. See *Earthy SALTS*. See also *Tartrate of Lime* under **LIME**.

The *tartrate of lime* is produced in a white precipitate, by adding tartareous acid to any soluble salt of lime, or lime to a soluble tartareous salt. Although this salt is insoluble in mere water in a common temperature, it dissolves readily in an excess of its own, or of any other acid that does not decompose it, such as the acetic or muriatic. It is also rendered soluble in water by the addition of potash. When it is heated strongly in an open fire the whole acid is consumed, and carbonate of lime remains.

**TARTRITES of Barytes and Strontian**, are formed in the same manner as tartrate of lime; but they are not so insoluble in water as this salt; and the tartrate of strontian will even crystallize from its hot-saturated solution by cooling. With *magnesia* and *alumine* this acid forms very soluble compounds, which do not crystallize by evaporation, but dry up into a gummy mass. Aikin's Dict.

**TARTSCHIN**, in *Geography*, a town of the duchy of Warfaw; 20 miles S.W. of Warfaw.

**TARTURA**, a town of Palestine, near the coast; 10 miles S. of Acre.

**TARVA**, a district of Arabia, on the banks of the Julfa.

**TARUD**, a town of Arabia, in the province of Hedjaz; 10 miles from El Catif.

**TARUD Esberif**, a town of Egypt, on the left bank of the Nile; 6 miles S. of Melaii.

**TARUDA**, in *Ancient Geography*, a town of Africa, in Mauritania Cæsariensis, near Ægea. Ptol.

**TARUDANT**, or **TARODANT**, in *Geography*, a town of Africa, and capital of the province, formerly kingdom, of Sufe, situated at the extremity of Morocco. The town is ancient and extensive, and is said to contain 25,000 inhabitants. It has a noble palace, to which belong gardens abounding with the most delicious fruits. Its population has lately decreased, and it is now famous only for saltpetre of a superior quality, for the manufacture of leather and saddles, and for dyeing. The town is watered by the river Sufe, which passes through it; and it is reported that ships formerly took in their cargoes at this place. It has sustained several sieges, and in the last, the inhabitants were reduced to the necessity of eating rats and burning their doors for fuel; 110 miles S.S.W. of Morocco. N. lat. 30° 20'. W. long. 8° 35'.

**TARVES**, a village in the district of Ellon, and shire of Aberdeen, Scotland, is situated on the banks of the river Ythan; 15 miles N. from Aberdeen, and 139 miles N. by E. from Edinburgh. The parish is about nine miles in length and six in breadth. The general appearance is flat, interspersed with some small hills; the soil is in some parts deep, and in others shallow; but mostly fertile. About a hundred acres are covered with thriving plantations. A general post-office is established here; and two fairs are holden annually. The public roads are in good repair. The parish church is ancient and ruinous. Here is a respectable parochial school, of which the salary is 300 marks, with school-fees and perquisites, and a rood of land. In the population return of the year 1811, Tarves was stated to contain 454 houses, occupied by 1804 persons.—Carlisle's Topographical Dictionary of Scotland, vol. ii. Gazetteer of Scotland, 8vo.

**TARVIDUM, TARVEDUM**, or *Orcas*, in *Ancient Geography*, a promontory on the southern coast of the isle of Albion, near the mouth of the river Nabaus.

**TARVIN**, or **TARVEN**, in *Geography*, a township and parish in the hundred of Edisbury, and county palatine of Cheshire, England, is situated on the London road, five miles N. by E. from Cheshire. It had for some time a weekly market, procured by sir John Savage, in the reign of queen Elizabeth; but this has been long discontinued. An annual fair was also held here till within the last thirty years, but was then abolished. Tarvin was one of the parliamentary garrisons during the civil wars: in August 1644, it was a short time in the possession of the royalists; but in the following month it was retaken for the parliament, and fortified with strong works. This and Nantwich were the only garrisons in Cheshire not abandoned on the reported approach of the king, in May 1645; and the parliament retained it till the end of the war. A grammar-school was founded here in the year 1600. John Thomafen, a celebrated penman, was master of this school thirty-six years in the early part of the last century. On the outside of the parish church is an inscription to his memory, stating that he "highly excelled in all the varieties of writing, and wonderfully so in the Greek character. Specimens of his ingenuity are treasured up in the cabinets of the curious and in the public libraries throughout the kingdom." The township of Tarvin was stated in the population return of the year 1811, to contain 180 houses, occupied by 921 persons. The parish is very extensive, and includes 11 townships, containing in the whole 2877 inhabitants, the number of houses being 525.—Lysons' *Magna Britannia*, vol. ii. part 2, Cheshire. Beauties of England and Wales, vol. ii. Cheshire, by J. Britton and E. W. Brayley.

**TARVISIUM**, or **TARVISO**, in *Ancient Geography*, a town of Italy, towards the N.W. of Venetia.

**TARUM**, in *Botany*, a name given by Pliny to the *agalochum sylvestre*, a species of aromatic plants.

**TARURAW**, in *Geography*, a town of the state of Georgia; 14 miles N. of Tugeloo.

**TARUS**, or **TAURO**, in *Ancient Geography*, a river of Gallia Cispadana, which ran towards the N.E., and E. of Trebia.

**TARUSA**, in *Geography*, a town of Russia, in the government of Kaluga, on the Oka. N. lat. 54° 52'. E. long. 36° 34'.

**TARUSATES**, in *Ancient Geography*, a people of Gallia Aquitania, mentioned by Cæsar in the 3d book of his Commentaries, who were compelled to submit by Crassus, Cæsar's lieutenant. Their city was named Vicus Julii and also Aturas.

**TARUSCO**, a town of Gallia Narbonensis, near Glenum.

**TARUSCONIENSES**, a people of Gallia Narbonensis, mentioned by Pliny, who occupied part of the territory of Tarascon on the Rhone.

**TARWAS**, in *Geography*, a town of Bengal; 28 miles E. of Nattore.

**TASAGORA**, in *Ancient Geography*, a town of Africa, in Mauritania Cæsariensis, on the route from Cula to Rufurum. Anton. Itin.

**TASAPAN**, in *Geography*, a small island in the East Indian sea, near Junkfcilon. N. lat. 8° 20'. E. long. 98° 14'.

**TASCA**, **LUIGI**, in *Biography*, an opera singer with a powerful base, or rather baritone voice, who arrived in England in 1782, was a good musician, and not only a useful performer at the opera, but at the oratorio, and in the performances at Westminster Abbey in commemoration of Handel. His voice, however, wanted mellowness and flexibility: for like an oaken plant, though strong, it was stiff.

**TASCHENMUL**, in *Ornithology*, a name given by authors to the *anas clypeata*, a species of duck, remarkable for the breadth of the end of its beak, and called in English the *broveller*. See *Broad-beaked Duck*.

**TASCHIEN**, in *Geography*, a river of Bavaria, which runs into the Regen, 2 miles W. of Cham.

**TASCHOW**, a town of Bohemia, in the circle of Leitmeritz; 5 miles N. of Leitmeritz.

**TASCIO**, or **TASCIA**, in *Coinage*, is a term, which either wholly or in part, appears on many ancient British coins, and which has puzzled our antiquaries, who have formed several different opinions concerning it. Mr. Camden, Mr. Baxter, Dr. Pettingal, and others, have thought that this word is derived from *Tasck* or *Tasck*, signifying in the original language of Britain any land-burthen or tribute imposed by the Tag, or prince, and that all the money which had *Tascia* or any of its abbreviations upon it, had been coined for no other purpose but to pay the tribute which had been imposed on the Britons by Julius Cæsar, and the portaria or duties upon merchandize, which had been exacted by Augustus and his successors. Against this opinion, however, others have urged strong objections. The derivation of *Tascio* from *Tag*, a prince, by the intervention of *Tasck*, a burthen or task, it has been said, is far from being clear. Money coined for the sole purpose of paying tribute, is a thing, say the objectors, unknown in the history of mankind; nor is it probable that Cunobeline, who was a free and independent prince, the friend but not the subject of the Roman emperors, would have admitted a word of such ignominious import as *Tascio* is in this sense of it, upon his coins.

A modern author (see *Wife Differt. in Numm. Bodl. Catal.* p. 227.), dissatisfied with the above interpretation of the word *Tascio*, has proposed another. He supposes that *Tascio* is an abbreviation of some nation or people to whom this money belonged, and of which Cunobeline was king; and finding in Pliny (lib. iii. c. 4.) a people of Gallia Narbonensis, called "*Tascodunitari Conorienfes*," in the MSS. "*Tascoduni Taruconienfes*," he conjectures, that Cunobelin *Tascio* may mean Cunobelin *Tascodunorum*. But this meaning is far-fetched, and depends upon improbable conjecture.

Another modern writer (see *Pegge's Ess. on Cunobeline's Coins*, p. 55.) has conjectured, that *Tascio* was the name of Cunobeline's mint-master, who struck all these coins. Although this opinion is more probable than the former, it is nevertheless strange, that this word, if it was a proper name,

should have been spelled by the person to whom it belonged in so many different ways, as *Tascio*, *Tascia*, and *Tascie*.

**TASCO**, in *Geography*, a town of Mexico, in the province of Mechoacan; 90 miles S.E. of Mechoacan. N. lat. 19° 5'. W. long. 101° 36'.

**TASCONI**, in *Ancient Geography*, a people of Gallia Narbonensis, mentioned by Pliny, who occupied part of the diocese of Montauban. Their city bore the same name, and was situated N. of Tolose.

**TASGOM**, in *Geography*, a town of Hindoostan, in Vissapour; 10 miles N. of Merritch.

**TASHAM DAGIH**, a mountain of Asiatic Turkey, between Amafreh and Samsoun.

**TASHKUND**, **TASCHKUND**, or *Al Shafsb*, a town of Turkestan, on the Sir. This town has been often destroyed and rebuilt; 210 miles N. of Samarcand. N. lat. 42° 40'. E. long. 64° 48'.

**TASHKUPRI**, a town of Natolia; 14 miles S.E. of Castamena.

**TASIEVA**, a river of Russia, which runs into the Tchiuma, about 20 miles N.W. of Tascievskoi.

**TASIEVSKOI**, a town of Russia, in the government of Tobolsk, on the Tascieva; 820 miles E. of Tobolsk. N. lat. 57°. E. long. 94° 14'.

**TASIO**, a river of Sweden, which joins the Angermann at Liden.

**TASIS**, τασίς, in *Rhetoric*, is used for the continuation of a period longer than the breath can bear. Voff. Rhet. lib. iv. p. 66.

**TAS-KUJE**, in *Geography*, a town of Persia, in the province of Laristan; 84 miles N.E. of Lar.

**TASLUI**, a town of Moldavia; 20 miles S. of Nicmeecz.—Also, a river of Moldavia, which runs into the Siret, near Adzud.

**TASMAN'S HEAD**, a cape on the coast of Van Diemen's Land. N. lat. 43° 33'. E. long. 147° 28'.

**TASMANIA**. See *Van Diemen's Land*.

**TASOPIUM**, in *Ancient Geography*, a town of India, on this side of the Ganges, near Caricardama, assigned by Ptolemy to the Sabaræ.

**TAS-POULSASON**, in *Geography*, a town of Chinese Tartary, in the country of Hami. N. lat. 40° 22'. E. long. 95° 54'.

**TASPOUR**, a town of Hindoostan, in Bahar; 27 miles E. of Hajypour. N. lat. 25° 52'. E. long. 85° 51'.

**TASSA POINT**, a cape on the coast of Guinea. N. lat. 8°. W. long. 12° 10'.

**TASSA-CORTA**, or **TASSA-CRODA**, a town on the W. coast of Palma, one of the Canary islands, which is an inconsiderable loading-place for vessels. N. lat. 28° 37'. W. long. 17° 58'.

**TASSASUDON**, **TASSISUDON**, or *Tassy-Sedlein*, a town of Asia, and capital of the Bootan country, situated in a valley, computed to be about three miles in length, and one in breadth, lying N. and S., through which runs the river Tehintchieu. This valley is in a high state of cultivation, bearing various kinds of grain, and diversified by clusters of houses. The castle, or palace of Tassifudon, stands near the centre of the valley, and is a building of stone, of a quadrangular form; the walls are upwards of 30 feet high, sloped a little from the foundation to the top; above the middle space is a row of projecting balconies, to each of which are curtains made of black hair; which are always drawn at night: the walls are pierced below with small windows, for the admission of air rather than light; and there are two entrances to the palace: the one facing the south by

a flight of wooden steps, edged with plates of iron, and the other, which is the grand entrance on the east front, ascended by a flight of stone steps. Even with these is a spacious gateway, with two masonry doors, fortified with knobs of iron, and secured when shut by a large bar of timber that slides within the masonry. Within is the central square building, which may be denominated the citadel, and which is the residence of the supreme Lama. It contains also the chief of their idols, Mahomoonie, amidst a multitude of others of inferior note. To the right and the left are avenues that lead to spacious squares, paved with flat stones, and to the apartments of the Lama. The citadel is seven stories high, each from fifteen to eighteen feet, and covered with a roof of low pitch, composed of fir timber; from the centre arises a square piece of masonry, supporting a canopy of copper, richly gilt, which is supposed to be directly over the great idol, Mahomoonie. The raja lives upon the fourth floor from the ground; above that are two other stories; and the seventh ladder reaches to the temple of Mahomoonie. The east, west, and south angles of the building correspond with each other, and have apartments on the ground floor appropriated for depositing all kinds of stores. A covered gallery runs all round them, beneath which are subterraneous places serving for kitchens. A range of good rooms, with boarded floors, on the first story, accommodates all the officers of state attendant on the raja, and those towards the square are skirted by a varande, supported by a row of handsome pillars, whose capitals are ornamented with carved work and gilding, and their sides painted with vermilion. Over this story is a sort of terrace of cement, with rooms more roughly finished for the inferior officers, called Zeenkerbs. For further particulars we refer to Turner's Embassy, in which is an engraving of the palace, and of the residence of Lama Glastoo in its vicinity. The road from Bengal to Tassafudon lies chiefly over the summits of stupendous mountains, or along the borders of craggy precipices: and between this city and Peridroog is a chain of mountains still higher than the other. These are visible from the plains of Bengal, at the distance of 150 miles, and are commonly covered with snow. They are a continuation of the mountains Emodus and Paropamisus of the ancients; 206 miles S.W. of Lassa. N. lat. 27° 48'. E. long. 89° 12'.

**TASSEL**, a sort of pendent ornament, at the corners of a cushion, or the like thing.—Also, a small ribband of silk sewed to a book, to be put between the leaves.

**TASSELS**, in a *Building*, those pieces of board that lie under the ends of the mantle-trees.

**TASSEL**, or *Tiercelet*, is also used in *Falconry* for a male hawk.

**TASSELS** are also a kind of hard burrs used by cloth-workers in dressing of cloth; they are the heads of the manured teasel.

**TASSES**, or **TASSETS**, in *Ancient Armoury*, appendages to the corselet, consisting of skirts of iron that covered the thighs, and that were fastened to the cuirass with hooks.

**TASSI**, **AGOSTINO**, in *Biography*, the cognomen of an artist whose real name was Buonainici. He was born at Perugia in 1566, and studied at Rome under Paul Brill, and received some assistance in the school of the Carracci. His loose and irregular conduct procured a seat for him on the bench of a gallery at Leghorn; and there, though under confinement and disgrace, he occupied his leisure in painting views of the objects with which he was surrounded; and when he obtained his liberty, such subjects became the favourite occupation of his pencil. His sea-ports, calms, and storms, were faithful transcripts of nature, and touched with great spirit and effi-

cacy. His views of architectural subjects thrown into perspective, which are in the pontifical palace of Monte Cavallo, and in that of the Lancellotti family, are admirable in their kind. His greatest honour, however, is having been the instructor of Claude de Lorraine. He died in 1642, aged 76.

**TASSING**, in *Geography*. See **TASSINGE**.

**TASSO**, **BERNARDO**, in *Biography*, an eminent poet, born at Bergamo of an ancient and noble family in the year 1493. became an early proficient in the Greek and Latin classics. His uncle, the bishop of Recanati, who was his instructor and patron, and supplied the place of a parent when he lost his father, having been assassinated by robbers in 1520, Bernardo was under a necessity of quitting his native city, and in 1525 became secretary to count Guido Rangoni, general of the papal army. Having been for a short time occupied in a similar situation under the dukes of Ferrara, he afterwards pursued his studies at Padua and Venice. In 1531 he published at Venice a volume of poems, which induced Ferrante Sanseverino, prince of Salerno, to invite him to his court. Having accepted this invitation, he recommended himself to the prince, and obtained annual stipends, amounting to 900 ducats. He accompanied his patron in several expeditions, and accompanying him to Naples, he there married Porzia de' Roffi, a lady of noble family. At Sorrento, whither he removed, he for some time led a tranquil and studious life; until his patron, in 1547, incurred the displeasure of the imperial court by concurring in presenting a petition against the establishment of the inquisition at Naples. On this occasion the prince joined the French party, so that he was declared a rebel, and his property was confiscated. Influenced by respect for his patron, Bernardo accompanied him to France, where at first he obtained encouragement, but being in process of time deprived of all support, and having lost his wife, he requested the prince's permission to leave him; and complying with an invitation to the court of Guidobaldo II., duke of Urbino, a distinguished patron of literary persons, he was liberally compensated for his past sufferings, and made a member of the celebrated Venetian academy. In 1563 he became secretary at the court of Mantua, and in the service of this court he died in 1569, being then governor of Ostiglia. The duke of Mantua caused his remains to be honourably interred in that city, and a marble monument to be erected over his tomb, bearing the simple inscription, "Ossa Bernardi Tassi." Of his poems, belonging to the class of "Romanesque," there were two; viz. "Amadigi," consisting of 100 cantos, and "Il Floridante," left unfinished, but corrected and published by his son Torquato, at Bologna, in 1587. His other works are five books of "Rime," with various kinds of poems, such as eclogues, elegies, hymns, odes, &c. He was also the author of "A Discourse concerning Poetry," and "Lectures," of which an edition has been given in three volumes.

**TASSO**, **TORQUATO**, pre-eminent as an Italian poet, was the son of Bernardo and Porzia de Roffi, born at Sorrento March 11, 1544, and sent at the age of five years to the Jesuits' school at Naples. Here his proficiency was so rapid, that in two years he recited, publicly, verses and orations of his own composition. At Bergamo, whither the circumstances of his family constrained him to remove, he prosecuted the study of Latin and Greek with such success, that at the age of twelve years, he was admitted into the university of Padua. Here his proficiency in various branches of literature was so signal, that in his seventeenth year he was honoured with degrees in the four branches of canon and civil law, theology, and philosophy. For law he had no predi-

predilection; but all the powers and affections of his mind were devoted to poetry. Thus distinguished, he was invited by the celebrated Ceti to Bologna, in the schools and academies of which city his talents were eminently displayed. During his residence in Bologna, he was charged with having written some defamatory verses, and deprived of his books; and though he avowed his innocence, he thought proper to withdraw from the city to a place called Castlevetro, where he was protected by the count Rangoni. Some time after this event he settled at Padua, and acquired distinction among the academicians denominated "Eterei." At the age of eighteen years he had published at Venice his poem of the Romanesque class, entitled "Il Rinaldo," which he dedicated to cardinal Luigi d'Este, in consequence of which he was invited, in 1566, to the court of Ferrara, where he was liberally accommodated, and where, it is said, he prosecuted the execution of his plan of the "Gerusalemme Liberata;" six cantos of which were composed in the 17th year of his life. In 1571 he accompanied the cardinal d'Este into France, where he was honourably received by Charles IX. and his court, and also by all the learned men of Paris. In the following year he returned to Italy, and caused to be represented his dramatic pastoral of "Aminta." Several cantos of his "Gerusalemme" were at this time dispersed in MS. throughout Italy, and in 1579 the fourth canto was printed in a collection of poems at Genoa. In the following year, fragments of 16 cantos were published at Venice, and we may naturally imagine that this mode of introducing to public notice a work on which he had bestowed much attention and labour, excited his displeasure. In 1581 three editions were printed, and of these, the third at Ferrara has been considered as that which first exhibited this celebrated work in its genuine form. It has occasioned some degree of surprise, that Tasso himself did not guard against these incorrect publications, by committing his work to the press in a more perfect state. His negligence in this respect has been attributed to some mental malady under which he laboured. Of the cause of this malady different accounts have been given. Tiraboschi has narrated a variety of circumstances, which operating on a mind like that of Tasso, might have contributed to produce, or at least to aggravate the mental disorder under which he laboured. His narration is recited in the General Biography; but within our limits we cannot do it full justice. His first provocation seems to have been excited by a courtier, who divulged the secret of his amours, in the presence-chamber of Alfonso, duke of Ferrara, and whom he publicly insulted, so that he was under a necessity of defending himself with his sword against the aggressor and his three brothers. The brothers were banished, and Tasso was confined to his apartment. Disturbed in his mind, and dreading worse consequences, he made his escape, wandered to Turin, Rome and Sorrento, and at length obtained permission to return to Ferrara. Suspecting some hostile design, he withdrew to the court of Urbino, and again returned to Ferrara. Here his disorder was so manifest, that Alfonso ordered him to be shut up in a hospital appropriated to lunatics. The evidence of his disorder is said by some to have been an indecorous liberty which he took in saluting the princess Leonora, the duke's sister; but others have thought this circumstance very improbable, and indeed it is hardly necessary to make an attempt for justifying the duke's conduct in the confinement of Tasso, after he had given so many incontestible proofs of mental derangement. At length, however, Tasso was restored to entire liberty. But his disposition to wander still continued; and it is lamentable to reflect, that, as one of his biographers observes, "the admired author of 'Jerusalem delivered,' the favourite of princes and the boast

of Italy, should have harboured in his mind something which defeated every plan to render his circumstances prosperous." His last retreat was with cardinal Cinzio Aldobrandini, at Rome, who obtained for him a pension from pope Clement VIII., and had intended, as a compensation for his sufferings, to procure for him the honour of a solemn poetical coronation in the Capitol; but the ceremony was delayed on account of the cardinal's illness, and Tasso manifested symptoms of approaching dissolution. As soon as he was apprized of his danger, he was removed to the convent of St. Onofrio, where, deriving every possible consolation from the kindness of the cardinal, and exhibiting every evidence of sincere piety, he closed his days in April 1595, at the age of 51. His remains were honourably interred, and after some time a monument was erected to his memory by cardinal Bonifacio Bevilacqua, in the church of St. Onofrio. Tasso, "in person, was tall, active, and well-proportioned, naturally of a firm temperament, and fit for all bodily exercises. He was sparing of words, sedate and grave in manner, and in conversation displayed little of the fire that animates his works. He was kind and affectionate in all his social relations, and conducted himself with great propriety in company."

His works are very numerous. Those in prose consist of a great number of treatises, dialogues, and letters, on moral, literary, and familiar topics. In poetry, his "Gerusalemme Liberata" is pre-eminent. "Its subject is singularly happy, its characters well-drawn and supported, its fictions strongly imagined, its style dignified, and its versification harmonious." His "Gerusalemme Conquistata," published in 1593, was a kind of recomposition of the former work, but less satisfactory to its readers. His "Aminta" has been already mentioned; his "Rime" consisted of occasional and miscellaneous pieces; his "Sella Giornata," or Works of the Seven Days, pieces on sacred topics, bear the impression of the gloomy state of his mind. Tiraboschi. Gen. Biog.

TASSO, in *Geography*, a small island on the W. coast of Africa, at the mouth of the river Sierra Leona.

TASSO, or *Tbaso*, an island of the Grecian Archipelago, situated in the gulf of Contesa, towards the W. extremity of Macedonia, and two leagues from the continent. The channel which separates that island from the main land is also divided by a sterile inlet called "Little Tasso," and in Greek "Tasso-poulo," the vestige of an ancient continuity of lands, at present separated. A spacious road, where the ground is good for holding, lies between the two islands. Tasso is the most northern of the islands of the Archipelago, and its high mountains, covered with forests, are seen at a distance. This island was formerly one of the most famous for its rich gold mines. Herodotus speaks of them, and they were under the direction of Thucydides. These mines led the Greeks to denominate it Chryse, signifying gold or gilt; its riches had become proverbial, and the expression was a "Thasos of wealth." Its natural treasures also were opals, amethysts, and other precious stones; but though these are lost, Tasso still furnishes the beautiful marble, that forms the greater part of the mountains, which was anciently held in such estimation by the Romans; the whiteness of which vies with snow, and the fineness of its grain with that of Parian marble. The inhabitants of Paros are said to have peopled the island of Tasso, and to have there built the town of Thasos, which was its capital, and the vestiges of which are still to be seen. The island is near 30 leagues in circumference; it produces abundance of corn, oil, wax, &c.; but the fertility, extolled by the ancients, is turned to no account for want of encouragement and cul-

ture. Its wines, famous even in the time of the Lower empire, as Chrysolom exclaimed against the excesses to which they gave rise at Constantinople, have no longer the excellent qualities which caused them to fetch a high price. Its population has experienced the same fate as the productions of its soil; it is considerably diminished. Tasso, however, has still remaining a kind of wealth very important to a maritime and trading nation; this is capital wood for ship-building. N. lat. 40° 34'. E. long. 24° 46'.

TASSONI, ALESSANDRO, in *Biography*, an Italian poet and man of letters, was born of an ancient and noble family, at Modena, in the year 1565. Notwithstanding various disadvantages in early life, such as the loss of his parents, a feeble diseased frame, and the persecution of enemies, he successfully cultivated Greek and Latin literature, poetry, and eloquence. At the age of twenty he sought further improvement in the university of Bologna, and here, as well as at Ferrara, he directed his particular attention to jurisprudence. Being under a necessity of seeking employment, he went to Rome, where, being known by his writings, he was admitted into the service of cardinal Colonne, as secretary, and accompanied him to Spain in the year 1600. Being afterwards domesticated with cardinal Cesi, he became a member of the academies degli Umoristi and de' Lincei, and was held in high estimation among the literati of Rome. A specimen of his "Pensieri diversi" (Thoughts on various Subjects) was published in 1608, under the title of "Questi," and the whole in 1612. His "Considerations on Petrarch" were first printed in 1609, and were intended to restrain the prevalent idolatry of this author. In 1613 he entered into the service of Charles Emanuel, duke of Savoy, in which situation he was regarded as an enemy to the Spanish monarchy; and he was considered as the author of "Philippics" against the Spaniards, and of a book entitled "Essequie della Monarchia di Spagna." In 1623 he quitted the family of Savoy; and about this time he finished "A Compendium of the Annals of Baroni." In 1626 he was taken into the service of cardinal Lodovico, nephew of Gregory XV.; and upon his death, in 1632, he was invited to the court of Francis I., duke of Modena, who gave him a pension and some honorary titles. Of this situation death deprived him in 1635, at the age of 70. One of his biographers says of him, that "he had a prepossessing countenance, with a cheerful expression, was open in conversation, a good speaker, serious or pleasant, according to the occasion, of a lively imagination, and sound judgment." The work by which the memory of Tassoni is chiefly preserved is his mock heroic poem "La Secchia Rapita." Tiraboschi. Gen. Biog.

This penetrating and learned writer, in the tenth book of his "Pensieri diversi," treats of music, ancient and modern, but not with his usual acumen or severity. He only retails the old stories of its miraculous powers among the ancients, and tries to match them by wonders pretended to be performed by its inferior perfections in modern times, without any remarks or reflections which discover a knowledge of the art, or doubts of the authenticity of these relations.

After speaking of extraordinary dilettante composers of music in modern times, he says, "among these we may enumerate James I., king of Scotland, who not only composed sacred music, but invented a new species of plaintive melody, different from all others; in which he has been imitated by the prince of Venosa, who, in our times, has embellished music with many admirable inventions."

This passage has given birth to two capital mistakes, into which the readers and writers of musical history have been led, particularly in Scotland. In the first place, it in-

sinuates that James I. was the inventor of the national melodies of that country; and secondly, that these melodies had been imitated in Italy by the prince of Venosa, a voluminous and celebrated dilettante composer of madrigals in the sixteenth century.

Unluckily for the favourers of these opinions, the Scots' national melodies can be proved of much higher antiquity, not only than David Rizzio, but the time of James I. See RIZZIO, JAMES I. of Scotland, and OSSIAN.

And the prince of Venosa, who was not the great musician he was reported to be by learned men who were ignorant of music, has not in all his works, which we have carefully examined, a single passage of melody which reminds us of the national tunes of Scotland; the melodies of which resemble those of no other country with which we are acquainted, except those of China. See VENOSA, and CHINESE Music.

Another Alessandro Tassoni of Modena, born in 1488, made a compilation of the different annals of that city, published in Muratori's Collection of Italian historians.

TASSOW, in *Geography*, a town of Moravia, in the circle of Iglau; 30 miles S.E. of Iglau.

TASSU, a town of Persia, in the province of Adirbeizan; 60 miles W. of Tauris.

TASTATURA, Ital., the whole range or set of keys, in an organ, harpsichord, virginal, spinet, clavichord, or piano-forte. The term is naturally formed from *tasto*, a touch, or key. The Italians, we believe, call the finger-board of the lute, guitar, viols, and all stringed instruments with a neck that is fretted, the *tastatura*.

TASTE, SAVOUR, a sensation excited in the soul by means of the organ of taste, viz. the papillæ of the tongue, &c.

Dr. Grew, in a lecture on the diversity of tastes, before the Royal Society, distinguishes them into *simple* and *compound*. By *simple* tastes he understands such as are simple modes of taste, although mingled with others in the same thing: thus, the taste of a pippin is aci-dulcis; of rhubarb, amar-altringent, and therefore compounded, in both; but yet in the pippin the acid is one simple taste, and the sweet another, as distinct as the bitter and altringent are in the rhubarb.

Two faults, he observes, have here been committed: the first, a defective enumeration of simple tastes; the second, a reckoning of them indistinctly among such as are compounded.

*Simple* tastes, of which we usually only reckon six or seven sorts, are at least sixteen: 1. *Bitter*, as in wormwood; whose contrary is, 2. *Sweet*, as in sugar. 3. *Sour*, as in vinegar; whose contrary is, 4. *Salt*. 5. *Hot*, as in cloves; to which is opposed, 6. *Cold*, as in sal prunellæ; for we may as properly say a cold taste as an hot one, since there are some bodies which do manifestly impress the sense of cold upon the tongue, though not to the touch. 7. *Aromatic*; to which is contrary, 8. *Nauseous*, or malignant. 9. *Soft*, which are either vapid, as in water, starch, whites of eggs, &c. or unctuous, as in oils, fat, &c. 10. *Hard*, of which he reckons four kinds. 11. *Penetrant*, which worketh itself into the tongue without any pungency; as is found in the root and leaves of the wild cucumber. 12. *Stupefacient*, as in the root of black hellebore, which, being chewed, and for some time retained upon the tongue, affects that organ with a numbness, or paralytic stupor. 13. *Astringent*, as in galls. And, 14. *Pungent*, as in spirit of sal armoniac; which two last tastes he makes contrary to the unctuous, as penetrant and stupefacient are contrary to the vapid one.

## TASTE.

The *compound* tastes are very numerous; but we have words to express but six of them: 1. *Austere*, which is astringent and bitter, as in the green and soft stones of grapes. 2. *Acerb*, properly so called, which is astringent and acid, as in the juice of unripe grapes. 3. *Acrid*, which is pungent and hot. 4. *Muriatic*, which is salt and pungent, as in common salt. *Lixivious*, which is saltness joined with some pungency and heat. 6. *Nitrous*, which is saltness joined with pungency and cold.

Taste constitutes one of the most obvious characters of bodies, and much is to be judged from it of the nature of many things. Dr. Abercromby, in a treatise partly written on this subject, has carried his observations so far, as to lay down a set of rules for the judging of any plant, or other body, without knowing what it is, merely from its taste, in regard to its virtues in medicine.

In order to judge of what he expressly means by the names of the several tastes, it is proper to add the list of them, with some of the things to which they are applied.

Plants, fruits, &c. are either sour as the common sorrel, harsh as the medlar, austere or rough as the quince, sweet as the fresh juice of ripe grapes, fat and oily as the sesamum, bitter as gentian or the wild cucumber, salt as common sea-salt, tart as garlic, or, lastly, insipid as the gourd, or of some mixed tastes, made of two or more of these.

The harsh or acerb things are cold, repelling, and binding, hardly concocted, and they may all be known upon the tongue by their contracting or drying it. The austere or rough things differ from these only in degree, as being somewhat milder in taste, and weaker in virtues.

The four or acid things are always cooling; but this never to excess, by reason of their penetrating parts: this taste is known by a biting on the tongue, but without any heat. Sweet things are all nutritive; and taking the word in its proper sense, they only have this quality. Their sweetness arises from their neither being too hot nor too cold upon the tongue.

Fat things are moderately hot, and, on this account they all, in some degree, moisten and relax; but they also obstruct: they are known from the sweet things by filling, and, as it were, anointing the tongue, without giving that sense of pleasure that the others do.

Salt things are astringent and deterfive; the one quality they have from their earthy part, the other from their watery.

Bitter things may be very beneficial to the stomach; but, in improper cases, they may also do hurt. The pungent bitters, such as the elaterium, or wild cucumber, are all hurtful, unless rendered safe by other means.

Tart things are hot, and often bad for the head, but good in heavy and phlegmatic constitutions: they are known by their heat in the mouth.

Lastly: insipid things in general have no peculiar quality, but are cold and watery; they are generally hurtful to the stomach, unless mixed with hotter and spicy things. Abercromb. Nov. Medic. Clavis.

It is observed by sir John Floyer, that the taste is so good a judge for us, that all the chemical principles in plants may be discovered by it, before their distillation. All watery plants shew their phlegm, as well to the taste as by distilling; and in all dry woods, the taste discovers the earth they contain, as well as a chemical analysis; by the mucilaginous and gummy taste, and by the manifest oiliness in some plants, we distinguish their abounding in oil as well as by the retort. The smell also helps us greatly in an extemporary judging of plants, and we are able to declare upon the spot, that all the aromatic plants, and all the fetid ones, contain a large

quantity of a volatile oil and salt. By the acrimony and pungency, we are well assured that there is a volatile salt in plants; and by the burning taste of others, we find that there is a corrosive salt in them. By a crude rough acidity, we distinguish the tartar or essential salt of plants to be in large quantity; but if the acidity be of a vinous smell, we observe that it is of a middle state of digestion, and may be called a vinous tartar, and distinguished from the first; but if the tartar have a pungent smell, then it is evidently a volatile tartar, or an acid acrid tartar.

The sweet tastes are more numerous in plants, and more varied among themselves than any other kind. These, in general, shew their oil by thin slimy smoothness, and their tartar is evident in their extracts, as is very plain in the common liquorice-juice.

The grass-sweets, as the common dogs-grass, and the like, have much essential salt, and a moderate portion of oil; and the rush, reed, horse-tail, and cats-tail, are all sweet and rough; some of these have more oil, and others more acid; and the most crude among them have more oil than tartar. The corn-sweets, as barley, rye, wheat, oats, millet, and rice, have much oil and essential salt, and a little volatile; so bread, prepared of any of these, yields, on analysis, oil and essential and volatile salt.

It is to be observed here, that fermentation and fire severally produce a volatile salt, where it was not before, by subtilizing and volatilizing the essential salt; and the slimy mealiness in corn supplies the oil. The goats-beard and feorzonera-kind have the same principles as the grasses, much oil and essential salt. The sub-acrid sweets, as rampions, campanulas, trachelia, and the like, contain much oil and essential salt; but the acrimony in these plants shews that they have also a volatile salt, and that in no small quantity; though Lemery, and the other chemical writers, have not observed this.

The ferns, polypodies, and all that class of plants, contain much oil and essential salt; but the chemists in general have omitted to mention an acrid principle in all these, which bespeaks a volatile salt; and fragranciness is observed in some of the harts-tongues, which bespeaks a volatile salt also, and volatile oil, though hitherto unobserved.

All the leguminous slimy sweets have more oil than tartar; but all of them have a large quantity of both. Beans, peas, and lentils, have also a volatile salt, as has also that strange fruit, eaten in Russia, and some other places, and called *lenticula aquatica* by some; but by the botanical writers, *tribulus aquaticus*; the other name belonging to the common duck-weed. The aromatic legumens, such as melilot, have an exalted oil, and volatile salt. The honey-suckle is said by Lemery, and the other chemists, only to have an essential salt and oil; but as there is a highly aromatic flavour, and great acrimony, there must be also a volatile salt.

These are some few instances, out of a vast number recited by the author, for the rest of which we refer to the paper itself in N<sup>o</sup> 280 of the Transactions. Philos. Trans. N<sup>o</sup> 299, p. 1160. See TASTING.

TASTE is also used, in a figurative sense, for the judgment and discernment of the mind.

We talk, and we hear every day of taste, of good taste, and of bad taste, and yet without well understanding what we mean by the word: in effect, a good taste seems to be little else but right reason, which we otherwise express by the word judgment.

To have a taste, is to give things their real value, to be touched with the good, to be shocked with the ill; not to be dazzled with false appearances; but, in spite of all colours,

lours, and of every thing that might deceive or amuse, to judge soundly.

Taste and judgment then should be the same thing; and yet it is easy to discern a difference: the judgment forms its opinions from reflection; the reason, on this occasion, takes a kind of circuit to arrive at its end; it supposes principles, it draws consequences, and it judges; but not without a thorough knowledge of the case: so that after it has pronounced, it is ready to render a reason of its decrees. Taste observes none of these formalities; before it has time to consult, it has taken its resolution: as soon as ever an object is presented to it, the impression is made, and the sentiment formed; and we ask no more of it. As the ear is wounded with an harsh sound, as the smell is soothed with an agreeable odour, before ever the reason has meddled with those objects, to judge of them; so the taste is struck at once, and prevents all reflection.

Reflections may come afterwards to confirm this taste, and discover the secret reasonings of its conduct; but it was not in its power to wait for them. Frequently, it happens not to know them at all; and what pains soever we use, we cannot discover what it was that determined it to think as it did.

This conduct is very different from that which the judgment observes in its decisions; unless we choose to say, that good taste is, as it were, a first motion, or a kind of inclinèd of right reason, which hurries us on with rapidity, and conducts us more securely than all the reasonings we could use. It is a first glance of thought, which discovers to us the nature and relation of things, as it were, by intuition.

In effect, taste and judgment are one and the same thing, one and the same disposition and habitude of the soul, which we call by different names, according to the different manners in which it acts: when it acts by sensation, by the first impression of objects, we call it taste; and when by reasoning, after having examined the thing by all the rules of art, &c. we call it judgment: so that one may say, taste is the judgment of nature, and judgment is the taste of reason.

Good taste, as defined by Madem. Scudery and Madem. Dacier, in an express treatise "Of the Corruption of Taste," is an harmony between the mind and reason; and a person has more or less of this taste, as that harmony is more or less just.

One might, perhaps, improve on this hint, and say, that good taste is nothing else but a certain ratio or relation between the mind, and the objects presented to it. Right reason cannot but be moved and affected with things conformably to it, and wounded by those contrary: there is, then, a kind of sympathy, which unites them as soon as ever they meet; and at their union, their good understandings discover each other.—Make a fine discourse; use only the richest and noblest expressions; if they contain an unhappy thought, or an incoherent reasoning, that thought, this reasoning, will immediately be felt by a person of taste: and the antipathy will shew itself by a movement of aversion, as sudden, as lively, and as natural, as that which nature inspires us withal for toads or spiders.

The term *taste*, used generally, is equivocal, and is used in at least three distinct acceptations. It sometimes means that peculiar mode of sensation, which resides in the tongue and palate; sometimes, the power of discrimination in the fine arts, or the feeling associated with it; sometimes, in a sense derived from the latter, it means liking or opinion in general.

It has been a subject of much controversy, whether taste, in the second sense, as we use the term in this article, be a distinct faculty, or merely a mode of judgment. The fact

seems to be, says an anonymous writer, that pleasurable emotions are excited by certain objects or conceptions, and that, when we embody our feelings in words, we use expressions of comparison, and reference to a standard, as in other propositions. Feeling and judgment therefore concur; but to which the word *taste* should be peculiarly applied, it is not easy to determine. The primary sense of the word, and of its equivalents in modern languages, seems to imply the former, as the word *criticism* manifestly refers to the latter meaning.

Dr. Gerard, in his ingenious and elaborate "Essay on Taste," observes, that a fine taste is neither wholly the gift of nature, nor wholly the effect of art. It derives its origin from certain powers natural to the human mind, but these must be assisted by culture, in order to attain their full perfection. Taste, according to this writer, consists chiefly in the improvement of those principles, which are commonly called the powers of imagination, and are considered by modern philosophers as internal or reflex senses, supplying us with finer and more delicate perceptions, than any which can be properly referred to our external organs. The simple principles of taste are the senses of novelty, of sublimity, of beauty, of imitation, of harmony, of ridicule, and of virtue. Any one of the internal senses, existing in vigour and perfection, forms a particular branch of taste, and enables a man to judge in some one subject of art or genius; but all of them must at once be vigorous, in order to constitute taste in its just extent. Taste will also derive considerable assistance from another principle, distinct from all the internal senses; and this is such a sensibility of heart or delicacy of passion, as fits a man for being easily moved, and for readily catching, as by infection, any passion that a work is fitted to excite, to which we might add the influence of casual associations on taste. Moreover, the most complete union of the internal senses is not of itself sufficient to form good taste, even though they be attended with the greatest delicacy of passion. They must be aided with judgment, the faculty which distinguishes things different, separates truth from falsehood, and compares together objects and their qualities.—Good sense is an indispensable ingredient in true taste, which always implies a quick and accurate perception of things as they really are; and, as the poet observes,

"Is, though no science, fairly worth the seven."

Taste, like every other human excellence, is progressive and improveable: and goodness of taste lies in its maturity and perfection; consisting, as Dr. Gerard says, in certain excellencies of our original powers of judgment and imagination combined. These may be reduced to four, *viz.* sensibility, refinement, correctness, and the proportion or comparative adjustment of its separate principles. All these must be in a considerable degree united, in order to form true taste. And this excellence of taste supposes not only culture, but culture judiciously applied. Want of taste unavoidably springs from negligence: false taste from injudicious cultivation. Sensibility of taste, we are told, depends very much on the original construction of the mind, and is less improveable by use than any other of the qualities of good taste. Refinement or elegance of taste is chiefly owing to the acquisition of knowledge, and the improvement of judgment. Refinement of taste exists only, where to an original delicacy of imagination, and natural acuteness of judgment, is superadded a long and intimate acquaintance with the best performances of every kind. And as sensibility of taste disposes us to be strongly affected with whatever beauties or faults we perceive; and refinement of taste makes

## TASTE.

makes us capable of discovering both, even when they are not obvious; so correctness of taste prevents our being imposed upon by false appearances, and either approving shining faults, or condemning chaste virtues, and enables us to assign to every quality its due proportion of merit or demerit: thus distinguishing the various kinds, and measuring the different degrees of excellence and faultiness. The last finishing and complete improvement of taste, result from the due proportion of its several principles, and the regular adjustment of all its sentiments, according to their genuine value, so that none of them may engross our minds, and render us insensible to the rest. This due proportion of the principles of taste pre-supposes the correctness of each, and includes, besides, an enlargement and comprehension of mind. Dr. Gerard has also considered, how far taste depends on the imagination, evinced the connection of taste with genius, and the influence of taste on criticism, illustrated the objects and the pleasures of taste, and traced the effects of taste on the character and passions.

“ Ingenuas didicisse fideliter artes,  
Emollit mores, nec sinit esse feros.”

Nothing is so improving, says Hume on the subject of delicacy of taste, to the temper, as the study of the beauties either of poetry, eloquence, music, or painting. They give a certain elegance of sentiment to which the rest of mankind are utter strangers. The emotions which they excite are soft and tender. They draw off the mind from the hurry of business and interest; cherish reflection; dispose to tranquillity; and produce an agreeable melancholy, which, of all dispositions of the mind, is the best suited to love and friendship. Besides, a delicacy of taste is favourable to love and friendship, by confining our choice to few people, and making us indifferent to the company and conversation of the greater part of mankind.

Taste, says Gerard, may be conceived as employing itself about nature, art, and science. With regard to nature, which is the common subject of the other two, taste and reason are employed in conjunction: as reason investigates the laws of nature, taste alone discovers its beauties. In art, taste is the ultimate judge, and reason but its minister. Scarcely any art is so mean, or so entirely mechanical, as not to afford subjects of taste. But the finer arts, which imitate the excellencies of nature, supply it with more proper materials; and thence derive their merit. Music, painting, statuary, architecture, poetry, and eloquence, (to which may be added gardening, including the art of improving grounds, and the stage,) constitute its peculiar and domestic territory, in which its authority is absolutely supreme. In science, reason is supreme, but may sometimes reap advantage from using taste as an auxiliary which serves to judge, not only of the manner in which science is communicated, but also of the subject-matter itself.

To this essay of Dr. Gerard are annexed three dissertations on the same subject; one by Voltaire; another by M. D'Alembert, read before the French academy in 1757, and intended to shew the great advantages of philosophy in its application to matters of taste, and to justify it from the accusations that have been brought against it by ignorance and envy; and the third is a fragment of Montesquieu.

We observe, that the arts above enumerated, are distinguished from those that are merely mechanical, as well as from the speculative sciences, by this circumstance; that their main end is neither utility, in the common sense of the word, nor instruction; but to minister to the pleasures of the imagination, by means of words, or of sensible images, or of

both of these combined. But their most eminent characteristic, perhaps, which runs through all of them, is, that many of their principles, though in one sense founded upon nature, since their only object is to delight the imagination of men, are not derived from ordinary nature; but require a good deal of attention, and the formation of habits, before they can be relished or understood. When we say, that these eight arts are the proper objects of taste, we do not intimate that their principles are altogether in common; or that he who is thoroughly acquainted, *e. g.* with the theory of painting, will be necessarily a good judge of poetry or architecture; since all of them have many rules originally arbitrary, the accurate knowledge of which has become indispensable to the man of taste; and which, in many cases, suggest pleasures to the imagination, not inferior to those which appear more directly natural. Nevertheless, a man who has applied the accuracy of discrimination, delicacy of feeling, and habitual reference to an original standard, in which the exercise of taste consists, to any one of those arts, can hardly fail, by sufficient attention and experience, to become a judge of all the rest. This observation, however, is liable to some exceptions, particularly in reference to music, which no one whose ear is naturally imperfect, will ever be able to understand. After all it must be allowed by those who maintain the necessity of admitting principles and a standard of taste, that a prodigious difference will be found to remain in the sentiments of mankind, with regard to matters of taste; and this diversity of sentiment in judging concerning the productions of art, may be ascribed to three causes; *viz.* want of feeling, or inability to enjoy, in any great degree, the pleasures of the imagination, as in the instance to which we have above alluded; want of knowledge, because, as the principles of the fine arts are founded partly on general nature, and partly on arbitrary rules, no just judgment can be formed of their general nature without much attention and experience; and the arbitrary rules pertaining to all the arts are numerous and complicated, and easily confounded by unskilful judges; and further, hastiness or precipitance of decision, by which men are often misled. Having already remarked, that the laws of taste are partly natural, and partly arbitrary, we here suggest, that under the former fall, in poetry and eloquence, whatever suggests associations generally delightful and interesting, or awakens sympathies, which the constitution of mankind leads them to feel; in painting, truth of imitation, and forcibleness of expression; in music, gratification of the ear and power over the affections. Under the latter may be reckoned, what is called, style in writing, and the observance of those rules with which critics are conversant, in the other arts. Besides, independently of principles of approbation and disapprobation which exist in the objects of taste, all men are more or less influenced by circumstances peculiar to themselves; and to this class belongs a variety of accidental associations.

A late excellent writer has defined taste to be the power of receiving pleasure from the beauties of nature and of art. Though taste, says this writer, be ultimately founded on a certain natural and instinctive sensibility to beauty, yet reason assists taste in many of its operations, and serves to enlarge its power. In this sense, it is a faculty common in some degree to all men. Quintilian, however, (*Instit. lib. vi. c. 3.*) seems to include taste under what he calls *judicium*. The characters of taste, when brought to its most perfect state, are all reducible to two, delicacy, which principally respects the perfection of that natural sensibility on which taste is founded; and correctness, which chiefly respects the improvement that faculty receives through its connection with

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the understanding: the former of these qualities is more the gift of nature; the latter more the product of culture and art. Among the ancient critics, Longinus possessed most delicacy; Aristotle most correctness. Among the moderns, Mr. Addison is a high example of delicate taste; and dean Swift, if he had written on the subject of criticism, would perhaps have afforded the example of a correct one. In determining the standard of taste, those who say that nature is this standard, lay down a principle very true and just, as far as it can be applied: nevertheless, conformity to nature is an expression very often used, without any distinct or determinate meaning: in a more clear and precise sense, nothing can be considered as the standard of taste, but the taste, as far as it can be known, of human nature. That which men concur the most in admiring, must be held to be beautiful. His taste must be esteemed just and true, which coincides with the general sentiments of men. In this standard we must rest. To the sense of mankind the ultimate appeal must ever lie, in all works of taste. But this sense is founded on those principles of reason and sound judgment, which are applicable to matters of taste: and yet the ultimate conclusions to which our reasonings lead, refer at last to sense and perception. Accordingly it is observed, that the difference between the authors who found the standard of taste upon the common feelings of human nature, ascertained by general approbation, and those who found it upon established principles, which can be ascertained by reason, is more an apparent than a real difference. For they who lay the greatest stress on sentiment and feeling, make no scruple of applying argument and reason to matters of taste; they appeal to established principles, and plainly shew that the general approbation to which they ultimately recur, is an approbation resulting from discussion as well as from sentiment. And they, on the other hand, who, in order to vindicate taste from any suspicion of being arbitrary, maintain that it is ascertainable by the standard of reason, admit, nevertheless, that what pleases universally, must on that account be held to be truly beautiful: and that no rules or conclusions concerning objects of taste, can have any just authority, if they be found to contradict the general sentiments of men.

However, it is not pretended, that there is any standard of taste, to which, in every particular instance, we can resort for clear and immediate determination. But it is sufficient to conclude, that taste is far from being an arbitrary principle, which is subject to the fancy of every individual, and which admits of no criterion for determining whether it be false or true. Its foundation is the same in all human minds. It is built upon sentiments and perceptions, which belong to our nature; and which, in general, operate with the same uniformity as our other intellectual principles. When they are perverted by ignorance or prejudice, they are capable of being rectified by reason. Their sound and natural state is ultimately determined by comparing them with the general taste of mankind.

The ingenious writer to whom we are indebted for the preceding observations, has distinguished between taste and genius. See GENIUS.

Mr. Alison has treated the subject of this article with so much ingenuity and elegance, in his "Essay on the Nature and Principles of Taste," that it would be almost sufficient, without further enlargement, to refer to his excellent performance.

According to this much approved writer, the perception of the qualities that are denominated *beautiful* and *sublime* in the works of nature and art, is attended with an emotion of pleasure, very distinguishable from every other pleasure of

our nature, and to which is appropriated the name of the "emotion of taste." Accordingly, the distinction of the objects of taste into the *sublime* and *beautiful*, has produced a similar division of this emotion into the "emotion of sublimity" and the "emotion of beauty." The qualities that produce these emotions occur amid every variety of *external scenery*, and among many diversities of disposition and affection in the mind of man. The most pleasing arts of human invention are altogether directed to their pursuit, and even the necessary arts are exalted into dignity by the genius that can unite beauty with use.

Our author, in his prosecution of this subject, first investigates the nature of those qualities that produce the emotions of taste, and then the nature of the faculty by which these emotions are received. He observes, that the theories which have been formed in relation to this subject have uniformly taken for granted the *simplicity* of this emotion, and have referred it to some *one* principle or law of the human mind; and have therefore concluded, that the discovery of that *one* principle was the essential key by which all the pleasures of taste were to be resolved. These theories are arranged, in consequence of the assumption of this fundamental principle, into two classes of supposition: *one*, which reduces the "emotion of taste" directly into an original law of our nature, which supposes a sense, or senses, by which the qualities of beauty and sublimity are perceived and felt, as their appropriate objects; and hence concludes, that the genuine object of the arts of taste is to discover and to imitate those qualities in every subject, which the prescription of nature has thus made essentially either beautiful or sublime. To this first class of hypotheses belong almost all the theories of music, architecture, and sculpture, the theory of Mr. Hogarth, of the abbé Winkelman, and, perhaps, in its last resort, also the theory of sir Joshua Reynolds; and of all those who attend more to the causes of these emotions, than to their nature. The *second* class of hypotheses refutes the idea of any new or peculiar sense, distinct from the common principles of our nature; which supposes some *one* known and acknowledged principle or affection of mind to be the foundation of all the emotions we receive from the objects of taste; and, therefore, resolves all the various phenomena into some more general law of our intellectual or moral constitution. Of this kind are the hypotheses of M. Diderot, who attributes all our emotions of this kind to the perception of relation; of Mr. Hume, who resolves them into our sense of utility; of the venerable St. Austin, who, with nobler views, one thousand years ago, resolved them into the pleasure which belongs to the perception of order and design, &c. This hypothesis has been adopted by rational and philosophic minds: by those who have been led by their habits to attend more to the nature of the emotions they felt than to the causes which produced them. Mr. Alison, pursuing an analysis of the effect which is produced upon the mind, when the emotions of beauty or sublimity are felt, concludes that it is very different from the determination of a "sense;" that it is not a simple but a complex emotion; that it involves, in all cases, the production of some simple emotion, or the exercise of some moral affection, and the consequent excitement of a peculiar exercise of the imagination; that these concomitant effects are distinguishable, and very often distinguished in our experience; and that the *peculiar* pleasure of the beautiful and sublime is only felt when these two effects are conjoined, and the complex emotion produced.

Our author having investigated the causes which produce this effect, or, in other words, the sources of the beautiful and sublime in nature and art, and having shewn that there is

no single emotion into which these varied effects can be resolved; but, on the contrary, that every simple emotion, and therefore every object capable of producing any simple emotion, *may be* the foundation of the complex emotion of beauty or sublimity; and that this complex emotion is never produced, unless, besides the excitement of some simple emotion, the imagination also is excited, and the exercise of the two faculties combined in the general effect;—proceeds to shew what is that “law of mind,” according to which, in actual life, this exercise of imagination is excited, and what are the means by which, in the different fine arts, the artist is able to awaken this important exercise of imagination, and to exalt objects of simple and common pleasure into objects of beauty and simplicity. In the last place, he investigates the nature of that faculty by which the emotions described by him are perceived and felt. This he shews has no resemblance to a sense; wherever it is employed, two distinct and independent powers of mind are engaged, so that it is not to be considered as a separate and peculiar faculty, but to be finally resolved into some general principles of our constitution. These speculations further lead to the important enquiry, whether there is any standard by which our sentiments on these subjects may be determined; to an explanation of the means by which taste may be corrected or improved; and to an illustration of the purposes which this peculiar constitution of our nature serves; in the increase of human happiness, and the exaltation of human character. Our limits will not allow any further abstract or abridgment of this valuable work; and we must refer those readers who wish to pursue disquisitions of this kind to the work itself, in 2 vols. edit. 4, 1815.

We cannot forbear citing some pertinent remarks, that are presented to our notice by a living writer of distinguished celebrity, professor Dugald Stewart. Taste, says this author, is not a simple and original faculty, but a power gradually formed by experience and observation. It implies, as its ground-work, a certain degree of natural sensibility; but it implies also the exercise of the judgment, and is the slow result of an attentive examination and comparison of the agreeable and disagreeable effects produced on the mind by external objects. In tracing the progress of taste from rudeness to refinement, we find an analogy to the progress of physical knowledge from the superstitions of a savage tribe to the investigation of the laws of nature, founded on the supposition, that, as in the material world there are general facts beyond which philosophy is unable to proceed, so, in the constitution of man, there is an inexplicable adaptation of the mind to the objects with which his faculties are conversant, in consequence of which, these objects are fitted to produce agreeable or disagreeable emotions. In both cases, reasoning may be employed with propriety to refer particular phenomena to general principles; but in both cases, we must at last arrive at principles of which no account can be given, but that such is the will of our Maker. In matters of taste it should be considered, that the tendency to casual association is much stronger than it commonly is, with respect to physical events; and when such associations are formed, they are not so likely to be corrected by mere experience, unassisted by study. Hence some have erroneously supposed, that association is sufficient to account for the origin of the notions we form concerning matters of taste; and that there is no such thing as a standard of taste founded on the principles of the human constitution. Whenever, says our author, association produces a change in our judgments on matters of taste, it does so by co-operating with some natural principle of the mind, and implies the existence of certain original sources of pleasure and unplea-

nes. The circumstances which please, in the objects of taste, are of two kinds: 1st. Those which are fitted to please by nature, or by associations, which all mankind are led to form by their common condition; and, 2dly. Those which please in consequence of associations arising from local and accidental circumstances. Hence we derive two kinds of taste; the one enabling us to judge of those beauties which have a foundation in the human constitution; the other, of such objects as owe their principal recommendation to the influence of fashion. These two kinds of taste are not always, indeed rarely, united in the same person. The perfection of the one depends upon the degree in which we are able to free the mind from the influence of casual associations; that of the other, on the contrary, depends on a facility of association, which enables us to fall in, at once, with all the turns of the fashion, and (as Shakspeare expresses it) “to catch the tune of the times.” For the author’s application of his principles and remarks to the subject of language, which affords numberless instances to exemplify the influence which the association of ideas has on our judgments in matters of taste, we must refer to his own valuable work. See Dr. Blair’s Lectures on Rhetoric, and Belles Lettres, vol. i. lect. ii. and iii. See also Hume’s Essay of the standard of taste, in his Essays, &c. vol. i. ess. xxiii. p. 253, edit. 1764. Stewart’s Elements of the Philosophy of the Human Mind, part ii. ch. v. § 2. Knight’s Analyt. Enq. into the Principles of Taste, 8vo. 1805. Alison on Taste, 2 vols. 8vo. 1815. Edin. Rev. N° XIV.

TASTE, in *Music*, is often confounded with *graces*, or change of passages; but a movement composed in good taste, is often injured by what are called graces. We rather suppose taste to depend on feeling and expression, than in flourishes, or, as the Italians call them, *riffioramenti*; in sorrow, pathos; in joy, brilliancy and fire. Yet when changes and embellishments are necessary, good taste is likewise requisite in their choice and application. The composer discovers his taste by his melodies, as much as the performer by expressing his thoughts.

Taste, says Rousseau, is of all Nature’s gifts the most easily felt, and the most difficult to explain; it would not be what it is, if it could be defined: for it judges of objects beyond the reach of judgment, and serves, in a manner, as a magnifying glass to reason.

There are some melodies more agreeable than others, though equally well phrased and modulated; there are combinations in harmony of great effect, and others that excite no attention, all equally regular as to composition; there is in the texture of the parts, an exquisite art of arranging and setting off one passage by another, which depends on something more subtle than the laws of contrast.

Genius creates, but taste selects. Genius is often lavish and redundant, and in want of a severe critic to prevent him from the abuse of his riches. Many great things may be achieved without taste; but it is taste that renders them interesting. It is taste which enables a vocal composer to seize and express the ideas of the poet; it is taste which guides the performer to the true expression of the composer’s ideas; it is taste which furnishes both with whatever can embellish and enrich the subject: and it is taste which enables the hearer to feel all these perfections. Taste is, however, not mere sensibility. A cold heart may have much taste; and a man transported with things truly spirited and impassioned, is little touched by grace and elegance. It seems as if taste attached itself to minute refinements, and sensibility to grand and sublime effects.

TASTE in *singing and playing*; *Gout du Chant*, Fr. According to Rousseau, there was, in his time, in France, a person

person distinct from the music-master, to teach the necessary *agrémens* or graces thought necessary to cover, in some degree, the insipidity of French melody. Most of the young students in music used therefore to have two masters, one for music and one for taste, called *Maitre de Gout-de-chant*.

*Gout-de-chant* likewise consisted in imitating or *taking-off* the voice and manner of a particular singer; which is always done by exaggeration. The face of a man with a mole or wart upon it, is of great use to a portrait painter in fixing a likeness: so a singer, with a little tendency to nasalty, to coarseness, to singing through the throat, or of quivering upon one note in attempting to shake, which the Italians have well denominated *tosse di capra*, a goat's cough, are easily taken off.

TASTINA, in *Ancient Geography*, a town of Asia, in the Greater Armenia, between Surta and Cozala. Ptol.

TASTING, the sense by which we distinguish flavours; or the perception which the soul has of external objects, by means of the organs of taste.

Authors differ much as to the organ of tasting. Bauhin, Bartholin, Vellingius, &c. place it in the laxer fleshy parts of the tongue: Dr. Wharton, in the glands at the root of the tongue; Laurentius, in the thin tunic covering the tongue; others in the palate, &c. But the great Malpighi, and after him all the latest writers, place it in the papillæ chiefly lying about the tip and sides of the tongue. See TONGUE.

These papillæ arise from the corpus nervosum, which covers the muscular flesh of the tongue; whence, passing through the corpus reticulare, they stand up under the external membrane of the tongue, erect, and covered with vaginæ, or sheaths of the said membrane, to defend them from objects too violent. These vaginæ are porous, and slick out so far, that when the aliment is squeezed, they enter with the same to receive the object, or the matter of taste.

These papillæ Boerhaave conjectures to arise from the ninth pair of nerves; and these, he asserts, are the only organ of taste: the others, whether of the tongue, palate, or jaws, &c. he observes, contribute nothing to them; though probably those of the cheeks next the dentes molares may.

The *object* of tasting, is any thing, either in animals, vegetables, or minerals, from which salt or oils may be extracted.

Tasting, then, is performed by the objects being attenuated and mixed with saliva, warmed in the mouth, and applied to the tongue; where, insinuating into the pores of the membranous vaginæ of the nervous papillæ, and penetrating to the surface of the papillæ themselves, it affects and moves them: by which means a motion is communicated along the capillaments of the nerve to the common sensory, and an idea excited in the mind, of salt, acid, sweet, bitter, hot, aromatic, austere, or the like; according to the figure of the particles that strike the papillæ, or the disposition of the papillæ to receive the impulse.

The taste, considered in a medical view, may be diminished by crusts, filth, mucus, apthæ, pellicles, warts, &c. covering the tongue: it may be depraved by a fault of the saliva, which, being discharged into the mouth, gives the same sensation as if the food which the person takes had really a bad taste; or it may be entirely destroyed by injuries done to the nerves of the tongue and palate. Few things prove more hurtful, either to the sense of tasting or smelling, than obstinate colds, especially those which affect the head. When the taste is diminished by filth, mucus, &c. the tongue ought to be scraped, and frequently washed

with a mixture of water, vinegar, and honey, or some other detergent. When the saliva is vitiated, which seldom happens, unless in fevers or other diseases, the curing of the disorder is the cure of this symptom. To relieve it, however, in the mean time, the following things may be of use: if there be a bitter taste, it may be taken away by vomits, purges, and other things, which evacuate bile: what is called a nidorous taste, arising from putrid humours, is corrected by the juice of citrons, oranges, and other acids: a salt taste is cured by plentiful dilution with watery liquors: an acid taste is destroyed by absorbents, and alkaline salts, as powder of oyster-shells, salt of wormwood, &c. When the sensibility of the nerves, which supply the organs of taste, is diminished, the chewing of horse-radish, or other stimulating substances, will help to recover it.

TASTNESS, in *Geography*, a cape on the N. of the island of Sanday. N. lat. 59° 10'. W. long. 2° 20'.

TASTO, in *Italian Music*, the touch or part of any instrument, whereon, or by means of which its notes are made to sound, be it on the neck, as lutes, viols, &c. which are called fixed and immoveable; or the front of organs, spinets, or harpsichords, where the keys are disposed to raise the jacks, called moveable touches; and is properly no more than the finger-board of each.

TASTO *Solo*. These two Italian words, written over or under a base to solos that are figured, generally at a pause, or preceding a close, imply that the accompanier on a keyed-instrument ought to play no chords with the right hand; but only to strike the base note with the left hand, which is implied by the word *tasto solo*, a single key; or at most to double that sound with the right hand in the octave: as it is hardly possible to divine or figure the harmony of an *ad libitum* or cadence, either written or played extempore, which the composer or the performer is allowed to write or play on these occasions. Solos are now no longer in fashion; but the violin solos of the early part of the last century, by Corelli, Geminiani, Somis, and Tartini, have all closes of this kind, to which the base is confined to a single note, or *tasto solo*.

TATA, or DOTIS, in *Geography*, a town of Hungary, built in the midst of water and swamps, with a castle; 20 miles W. of Gran.

TATA Youba, in *Botany*, a name used by some for the tree which yields what the dyers call the fustic, or yellow wood used in dyeing.

TATACUL, in *Geography*, a town of Hindoostan, in Mysore; 11 miles N. of Vencatighery.

TATALISGA, a town of Africa, in Galam, on the Senegal; 60 miles W. of Galam.

TATAPARY, a town of Hindoostan, in the province of Tinevelly; 15 miles N.E. of Palameotta.

TATAPATNAM, a town of Hindoostan, in Bara-maul; 22 miles S.S.E. of Darempoury.

TATAR BASSARODSCHII, a town of European Turkey, in Romania, on the Mariza; 16 miles N.N.W. of Filipopoli.

TATAR Bunar, a town of European Turkey, in Bessarabia; 32 miles S.W. of Akerman.

TATARSKOI, a fort of Russia, in the government of Kolivan, on the E. side of the Irtsch. N. lat. 53° 44'. E. long. 85° 34'.

TATENAGUR, a town of Hindoostan, in the Carnatic; 6 miles S.W. of Devicotta.

TATENAY, the chief town of the island *Gilolo*; which see.

TATH, in *Old Laws*, a privilege which some lords of manors enjoyed, of having their tenants' sheep folded at

right on their demefne lands, for the improvement of the ground.

**TATH**, in *Agriculture*, a term applied by flock-farmers, in fome fituations, to all fuch graffes as are particularly rank and luxuriant, and which have a tendency to induce the rot in fheep.

They commonly diftinguifh two kinds of it; namely, the *water-tath*, which arifes and proceeds from an excefs of moisture; and the *nolt-tath*, which is the produce of dung. The latter, it is faid, is darker coloured than the former; but that their foftnefs, luxuriancy, and tendency to produce the rot in the animals, are nearly the fame. The water-tath is noticed to be the produce of either lands naturally too moift, or of wet feafons, of accidental or artificial floodings of them, or of fome other fuch caufes. Nothing is fo apt, it is fupposed, to produce the rot in thefe animals, as the grafs which grows in low marfhy grounds, in what is called *awald* lands, and that around the heads of fprings, efpecially on the north fide of hills, infomuch fo, indeed, that fuch paftures were formerly confidered as naturally rotten, and of courfe rejected by all intelligent fheep-farmers.

In fhort, wherever a very foft and tender tath fuddenly rushes up in fheep-pafture lands, there is always much danger of its effects; and as dung greatly promotes the growth of very rank tath, the pernicious confequences of fuch nolt-tath are to be remedied, by not allowing horfes or neat cattle to pafure among the fheep.

**TATHAA**, in *Geography*, a river of Africa, which runs into the Indian fea, S. lat. 28° 20'.

**TATHILBA**, in *Ancient Geography*, a town of India, on this fide of the Ganges, which belonged to the Bidamæi. Ptolemy.

**TATIAMBETTY**, in *Geography*, a town of Hindooftan, in Myfore; 5 miles N. of Wombinellore.

**TATIAN**, in *Biography*, a native of Affyria, from which circumftance he is fometimes called "the Affyrian," and an ecclefiaftical writer, who, according to Cave, flourifhed about the year 172. He was originally a heathen, and by profefion a fophift, and teacher of rhetoric. His reading appears to have been extenfive, and he is allowed to have been well acquainted with Grecian literature and philofophy. After his converfion to Chriftianity, he became a difciple of Juftin Martyr, to whom he was attached, and of whom he fpeaks with great refpect. He accompanied this father to Rome, and travelled through different countries with a view to his improvement. But fome time after Juftin's death, which happened about the year 165, he adopted a number of abfurd opinions. Accordingly he is charged, and probably not without reafon, with being the founder of the feft of the Eneerates; he condemned the ufe of wine, and denied the lawfulness of marriage, the reality of Chrift's fufferings, and the falvation of Adam. He alfo embraced the Æons of Valentinus, and asserted with Marcion, that there are two gods. Eufebius dates his herefy about the twelfth year of the emperor Marcus Antoninus, or the year 172. But however erroneous were his principles in the latter part of his life, his works afford us fatisfactory evidence of the antiquity and high efteem of the gospels in his time. After propagating his doctrines for fome time at Rome, he opened a fchool in Mefopotamia, about the year 172: and he is faid to have preached at Antioch, and in fome other places. The place and time of his death are not known. He appears to have written a confiderable number of books, one of which, ftill extant in Greek, and entitled "Oratio ad Græcos," or Oration againft the Gentiles, was either an apology for Chriftianity, or an attack on Heathenifm. This was firft printed at Zurich in 1546, with the Latin verfion of Conrad Gefner. It is an-

nexed to the edition of Juftin Martyr's works, and thofe of other fathers: but the beft edition is that of Worth, Greek and Latin, Oxon. 1700, 8vo. His defign in this work, which difplays great learning, was to prove that the Greeks were not the inventors of any of the fciences, but that they were indebted for their acquaintance with them to thofe whom neverthelefs they denominated Barbarians. This work, according to Brucker, every where breathes the fpirit of the Oriental philofophy, the leading tenets of which he details; and he feems to have adopted feveral of the opinions of Plato, and of the Alexandrian Platonifts, concerning the creation of the world by the Logos, and its animation by a fubordinate fpirit; concerning the exiftence of demons in material vehicles, who occupy the aerial regions, and that of æons, who refide above the ftars. He alfo held with Plato the imperfection of matter as the caufe of evil, and thence he inferred the meritorioufnefs of rifing above corporeal appetites and paffions. Another work of Tatian, cited by St. Clement, was entitled "Perfection according to the Saviour," in which he argued againft marriage. Eufebius cites another work compofed by Tatian, which was a "Book of difficult queftions, for the explication of feveral obfcure places of Scripture." We have alfo in Latin a work afcribed to Tatian, called "Harmony" or "Dia-Teffaron" of the Four. But fome approved writers have doubted whether we have one copy of Tatian's Harmony now extant. Dr. Lardner has investigated this fubject with his ufual judgment and impartiality: and he inclines to the opinion, that we are in poffeffion of this work; and he thinks that the commentaries written upon it by Ephrem, the Syrian, afford reafon for concluding that it was not fo contemptible or fo heretical as fome have thought. This Harmony is fhorter than that attributed to Ammonius, and contains a compendious hiftory of our Lord and Saviour Jefus Chrift, taken out of the four Gospels. It confifts of four parts; the firft is a kind of introduction, containing the hiftory of our Lord's nativity, and the former part of his life; the other three parts are the three years of our Lord's miniftry. Brucker by Enfield. Lardner's Works, vol. ii.

**TATIANITES**, **TATIANITÆ**, in *Ecclefiaftical Hiftory*, a feft of ancient heretics; thus called from Tatian, a difciple of Juftin Martyr.

This Tatian, who has the character of one of the moft learned men of all antiquity, was perfectly orthodox during the life of his mafter. He was, like him, a Samaritan, by nation, not by religion, as Epiphanius feems to infinuate. They both belonged to the Greek colonies which were fpread throughout the country of the Samaritans.

Juftin being dead, Tatian is faid by fome to have inclined to many of the errors of the Valentinians; but Mofheim fays, that his doctrine approached nearer to that of the oriental philofophy concerning the two principles. He adds, that it appears from the testimony of credible writers, that Tatian looked upon matter as the foundation of all evil, and therefore recommended, in a particular manner, the mortification of the body; that he diftinguifhed the creator of the world from the Supreme Being: denied the reality of Chrift's body; and corrupted the Chriftian religion with feveral other tenets of the oriental philofophy. (See the preceding article.) He had a great number of followers, who were, after him, called *Tatianifts*; but were neverthelefs more frequently diftinguifhed from other fefts, by names relative to the austerities of their manners. For as they rejected, with a fort of horror, all the comforts and conveniences of life, and abftained from wine with fuch a rigorous obftinacy, as to ufe nothing but water, even at the celebration of the Lord's fupper; as they macerated their bodies by continual fasting, and lived a fevere life of

celibacy and abstinence; so they were called Eneatitæ, or temperate; Hydroparastatæ, or drinkers of water; and Apotactitæ, or renouncers. Mosh. Eccl. Hist. vol. i.

TATIANSKAIA, in *Gography*, a fort of Russia, in the government of Saratov, on the Volga; 12 miles S.E. of Tzaritzin.

TATIEN, a town of Chinese Tartary; 55 miles N.E. of Tam-fan.

TATILLUM, in *Ancient Geography*, a town of Africa, in Mauritania Cæsariensis, on the route from Carthage to Cæsarea, between Aræ and Aufa. Anton. Itin.

TATISCHEVA, in *Geography*, a fortress of Russia, in the government of Upha, on the Ural; 28 miles W. of Orenburg.

TATISM KOU, a mountain of Persia, in the province of Irak; 12 miles N. of Com.

TATIUS, ACHILLES, in *Biography*, a Greek writer of Alexandria, is supposed to have lived in the latter part of the third century. He is known to us as the author of a work on the Sphere, of which there remains a fragment, being an introduction to a commentary on the Phenomena of Aratus. A copy of this from a MS. in the Florentine library, by Peter Victorius, was printed. It was afterwards translated into Latin by Petau, under the title of "Ilogoga in Phænomena Arati." We learn from Suidas, that Tatius also wrote "Erotics," in which he includes "the Loves of Leucippe and Clitophon." This work is preserved, and affords one of the examples of Greek romance. The Latin version of it was made by Annibal Cruceius, and published at Basil in 1554. The latest edition of this piece is that of Bodem, Greek and Latin, Lips. 1776, 8vo. It is elegantly written, but of a licentious cast; and hence it has been inferred that the author was a heathen, when he composed it; but Suidas affirms, that he afterwards became a Christian, and attained to episcopacy.

TATNALL, in *Geography*, a county of the state of Georgia.

TATOBIT, a town of Bohemia, in the circle of Bolef-lau; 5 miles E. of Turnau.

TA-TOU-CHE, a town on the W. coast of the island of Formosa. N. lat. 24° 8'. E. long. 119° 58'.

TA-TSIN, a river of China, which runs into the sea. N. lat. 37° 46'. E. long. 118° 19'.

TATTA, supposed to be at or near the ancient *Pattala*, a town of Asia, which, before the building of Hyderabad, was considered as the chief city of Seind, was founded, according to the tradition of the natives, in the 906th year of the Hegira, and stands on a rising ground, four miles W. of the Indus. It has still a population of 18,000 souls, and is about four miles and a half in circumference. Its wall, constructed for its defence, is now in ruins. The houses of the higher rank are built of bricks, but those of the lower class of wood, plastered with mud. The remains of the mosques, and other handsome edifices of this city, are evidences of its former prosperity; and although on the decline, it enjoys a considerable trade. Its trade is much diminished, on account of the bad government of Seind or Sindy, and the hostile or rapacious disposition of the Seiks, the present possessors of the countries of Moultan and Lahore. The country in the vicinity is a fine rich soil, being watered by canals drawn from the river. Agriculture, however, is much neglected, and the inhabitants of Tatta indicate extreme poverty and wretchedness. To the north of the city is a range of hills, extending several miles in a northerly direction; and to the south is also a range of Table land, reaching almost to the banks of the Indus. Boats trading to Tatta come no farther than Begemah, a village at the distance of about five miles. The

river at this place is about a mile in breadth, and four fathoms in depth in the deepest parts. N. lat. 24° 44'. E. long. 68° 17', as stated in Kinneir's account of Persia; but according to major Rennell, N. lat. 24° 50'. E. long. 67° 37'.

TATTAH, a town of Africa, on the frontiers of Drali and Morocco, in the route from Morocco and Sufe to Tombuctoo; 170 miles S.S.E. from Morocco. N. lat. 28° 25'. W. long. 6° 15'. Tattah and its territory contain 10,000 inhabitants. Jackson's Morocco.

TATTAHAR, a town of Bengal; 13 miles N. of Toree.

TATTAMUNGALUM, a town of Hindoostan, in Calicut; 5 miles S. of Palcaudery.

TATTAR. See Yool.

TATTARAN, a small island in the Sooloo Archipelago. N. lat. 6° 10'. E. long. 121° 58'.

TATTERSHALI, a small market-town in the wapentake of Gartree, Lindsey division of the county of Lincoln, England, is situated on the river Bain, near its junction with the Witham, 9 miles S.S.W. from Horncastle, and 130 miles N. from London. The manor was granted by William the Conqueror to Eudo, one of his Norman followers, whose descendants assumed the name of Tattershall, from this place. Robert Fitz-Eudo obtained a grant from king John, for the inhabitants of the town to hold a weekly market; and another of the family, in the time of Edward III., received the royal licence to erect a castle within his manor of Tattershall. But the present fortress was built by sir Ralph, afterwards lord Cromwell, treasurer of the Exchequer to Henry VI. The castle and manor were granted by Henry VII. to Margaret, countess of Richmond, and entailed on the duke of Richmond; who dying without issue, they were granted by Henry VIII. to the duke of Suffolk; and in the next reign passed to Edward, lord Clinton, afterwards earl of Lincoln. By marriage with an heiress of the Clintons, they are now in the possession of lord Fortescue. The castle stands on a level moor, and is surrounded by two great fosses, the outer one formed of earth, and the inner faced with brick, ten feet deep. It was originally intended as a place of defence, and was progressively raised to great height and extent. In the civil wars it was, however, dilapidated. Till very lately the principal gateway was remaining: the part at present left standing, is a square tower of brick, flanked by four octangular embattled turrets, which are crowned with spires covered with lead. It was divided into four stories. The main walls were carried to the top of the fourth story, where a capacious machicolation surrounded the tower, on which there is a parapet wall of great thickness. This was to protect the persons employed at the machicolations. The tower is constructed upon ponderous groined arches, which support the ground-floor. Near the outer moat stands the parish church, a beautiful and spacious edifice, built in form of a cross. Few churches, perhaps, have suffered more dilapidations than this. It consisted of a nave, having five large arches on a side, and eight clerestory windows, placed in pairs; on each side is a transept, and a magnificent choir. The windows of the latter were glazed with stained glass, which was removed, by a late earl of Exeter, to the chapel of Burleigh, on condition that he replaced it with plain glass, which could have been done for the sum of forty pounds; but this being neglected, the inside has suffered greatly from the weather; although the walls, roof, and pavement remain almost entire. The ruined screen and stalls of wood, richly carved, are almost rotten: behind it is a stone screen, in the arches of which are painted figures. The body of the church and transept had their windows richly adorned with the legendary histories

histories of Romish saints. Before the altar lay two rich brass figures of Ralph, lord Cromwell, who died in 1455, and of Margaret his wife, who died in 1453. This nobleman, in the seventeenth year of Henry VI., obtained a licence to make the church of Tattershall collegiate, for a master or warden, six priests, six secular clerks, and six choristers. He also founded, near the church-yard, an hospital or almshouse, for thirteen poor men and women. At the dissolution, the collegiate revenues were granted to Charles, duke of Suffolk. The hospital still remains, with a small endowment. The population report of the year 1811, stated that Tattershall contained 506 inhabitants, occupying 105 houses. The market is held on Tuesdays, and there are three fairs annually.—*Beauties of England and Wales*, vol. ix. Lincolnshire, by J. Britton, F.S.A. *History, &c. of Tattershall, with plates*, 8vo. 1801.

TATTICOMBA, a town of Hindoostan, in Mysore; 4 miles N. of Dindigul.

TATTO, Ital. from *Tactus*, Lat. in *Musick*, implies a measure, or bar, the period when the hand or foot is beaten down in marking the time. See TACTUS, and BATTUTA.

TAT-TOO, *g. d. Tap-to*, a beat of a drum, at night, to advertise the soldiers to retreat, or repair to their quarters in a garrison, or to their tents in a camp. See RETREAT.

TATTOOING, in *Modern History*, a name given at Otaheite, and other islands of the South sea, to the operation of staining the body. For this purpose they prick the skin, so as just not to fetch blood, with a small instrument, somewhat in the form of a hoe, or blade of a saw: that part which answers to the blade is made of a bone or shell scraped very thin, and from a quarter of an inch to an inch and a half wide: the edge is cut into sharp teeth or points, from the number of three to twenty, according to its size. When this is to be used, they dip the teeth into a mixture of a kind of lamp-lack, formed of the smoke that rises from an oily nut which they burn instead of candles, and water, or charcoal-dust diluted with water; the teeth, thus prepared, are placed upon the skin, and the handle to which they are fastened, being struck by quick smart blows, with a stick fitted for the purpose, they pierce it, and at the same time carry into the puncture the black composition, which leaves an indelible stain. This operation is performed upon the youth of both sexes, when they are about twelve or fourteen years of age, in several parts of the body, and in various figures, according to the fancy of the parent, or perhaps the rank of the party. The women are generally marked with this stain in the form of a Z, in every joint of their fingers and toes, and frequently on the outside of their feet: the men are also marked with the same figure; and both men and women have squares, circles, crescents, and ill-designed representations of men, birds, or dogs, and various other unintelligible devices, impressed upon their legs and arms. But the part on which these ornaments are lavished with the greatest profusion is the breech; this, in both sexes, is covered with a deep black; above which, arches are drawn over one another, as high as the short ribs. These are often a quarter of an inch broad, and the edges are indented. These arches are exhibited, both by the men and the women, with singular ostentation. The face in general is left unmarked. Some old men had the greatest part of their bodies covered with large patches of black, deeply indented at the edges, like a rude imitation of flame. It is only at New Zealand, and in the Sandwich islands, that they tattoo the face. There is also this difference between the two last, that, in the former, it is done in elegant spiral volutes, and in the latter, in straight lines, crossing each other at right angles. The hands and arms of the women are very neatly marked, and they have

among them a singular custom, the meaning of which could not be learned, that of tattooing the tip of the tongues of the females. This custom of tattooing, it is apprehended, is frequently designed as a sign of mourning on the death of a chief, or any other calamitous event. Persons of the lowest class are often tattooed with a mark, that distinguishes them as the property of the several chiefs to whom they belong. Hawkesworth's *Voyages*, vol. ii. p. 189. Marchand's *Voyage*, vol. i. p. 99. Cook's *Third Voyage*, vol. iii. p. 155.

TATTUBT, anciently TADURTI, in *Geography*, a town of Algiers, formerly a considerable city, now almost completely in ruins: some beautiful granite pillars were dug up some years ago, and placed in a mosque at Constantina; 25 miles S. of Constantina.

TATU, in *Ancient Geography*, an island situated in the Nile, in the vicinity of the town of Meroe. Pliny.

TATU, in *Zoology*, the Brazilian name for the armadillo, or shell-hedge-hog, or *dasyfus* of Linnæus. See DASYFUS.

TATU-APARA, the name of a creature of the armadillo kind, being the three-banded or *tricinctus dasyfus* of Linnæus. See DASYFUS.

This animal burrows under ground, keeps its hole in the day, and rambles out at night: when it would sleep, or when it is afraid of being taken up, it contracts its crust into a round figure; and hiding its whole body within, it might sooner be taken for a sea-shell than a land-animal. It is hunted with little dogs, feeds on potatoes, &c. drinks much, grows very fat, and is reckoned delicious eating when young, but when old, has a musky disagreeable taste; breeds every month, and brings four at a time. Ray and Pennant.

TATU-MUSTELINUS, the *Weasel-banded Armadillo*, the name of a small animal of the armadillo kind. This is the *dasyfus uncinatus* of Linnæus, and banded armadillo of Pennant: it has a very slender head, small erect ears, the crust on the shoulders and rump consisting of square pieces; eighteen bands on the sides; five toes on each foot; length from nose to tail about fifteen inches; the tail five and a half. It inhabits South America. Ray, Pennant, and Grew's *Mus. Reg. Soc.* p. 19.

TATU-PABA of Brasil, is the six-banded *dasyfus* of Linnæus, having the crust of the head, shoulders, and rump, formed of angular pieces, and between the bands, and also on the neck and belly, a few scattered hairs; the tail thick at the base, tapering to a point, and not so long as the body, and five toes on each foot. It inhabits Brasil and Guiana. Pennant.

TATU-PORCINUS, the name of the pig-headed armadillo, or nine-banded *dasyfus* of Linnæus, with long ears, crust on the head, shoulders, and rump, marked with hexangular figures; the nine bands on the sides distinguished by transverse cuneiform marks; breast and belly covered with long hairs; four toes on the fore-feet, and five on the hind; the tail taper, and a little longer than the body; and length of the whole animal three feet. This animal inhabits South America: and one, that was brought into England a few years ago from the Mosquito shore, was fed with raw beef and milk, but refused our grains and fruit. Pennant.

TATUETE, the name of a species of tatu, or armadillo, being the nine-banded *dasyfus* of Linnæus, though Buffon and Pennant ascribe to it only eight bands; it has upright ears, two inches long; small black eyes; four toes on the fore-feet, and five on the hinder ones; the length from nose to tail about ten inches, the tail nine: it is of an iron colour on the back, and whitish at the sides; its belly also is whitish and naked, except for a few hairs. It inhabits Brasil.

The flesh of this is accounted more delicious than that of any other creature of this kind, though they may all be eaten. Ray and Pennant.

TATULA, in *Botany*, a name used by Clusius, and some other authors, for the stramonium, or thorn-apple.

TATZO, in *Geography*, a town of Hungary; 40 miles E. of Munkacz.

TAU, in our *Ancient Customs*, signifies a cross.

"Tradendo dicto comiti Thau eboreum." So Mr. Selden, in his notes upon Eadmerus, p. 159. "Ego Eadgisa prædicti regis ava hoc opus egregium crucis Taumate consolidavi." See Mon. tom. iii. p. 121.

TAU, in *Entomology*, a species of beetle. See SCANA-BÆUS.—Also, a species of *Phalena bombyx*.—Also, a species of *Musca*.

TAU, or *Taw*, in *Heraldry*, an ordinary, in figure of a T, supposed to represent St. Andrew's cross, or a cross potent, the top part cut off.

It is thus called from the name of the Greek T, *tau*.

TAU, in *Ichthyology*, a species of *Gadus*; which see.

TAUA, in *Ancient Geography*, a town of Egypt, and the metropolis of the nome Phthemphtus. Ptol. and Steph. Byz.—Also, a town of Asia, between Namaris and Augara. Ptol.—Also, a gulf of the isle of Albion, on the south-eastern coast. This estuary is the firth of Tay.

TAUA, in *Geography*, a town of Egypt; 12 miles S. of Denutar.

TAVACCARÆ, in the *Materia Medica*, the name by which many authors call the *coccus Maldivia*, or Maldive nut.

TAUAG, in *Geography*, a town of Persia, in Farsistan; 39 miles S.E. of Bender-Rigk.

TAVAI, an island in the Indian sea, near the coast of Siam, about 20 miles long and 3 broad. N. lat. 13°. E. long. 97° 52'.

TAVAI, a town of Asia, in Lower Siam; 148 miles S. of Martaban. N. lat. 14° 10'. E. long. 98° 12'.

TAVAI Point, the extreme point of a tract of land on the coast of Lower Siam. N. lat. 13° 40'. E. long. 98°.

TAVAI or *Tovy Poenamoo*, the southernmost of the two islands into which New Zealand is divided by Cook's Strait, which is for the most part mountainous and apparently barren, and in this respect of a less favourable aspect than the other island, or *Eabeinomanuwe*; which see. The straits, which are about four or five leagues broad, were discovered by Capt. Cook at the close of the year 1769. The islands are situated between the latitudes of 34° and 48° S., and between the longitudes of 181° and 194° W. Tavai-Poenamoo is said to be 500 miles long from S.W. to N.E., and from 55 to 140 broad. See *NEW ZEALAND*.

TAVANAGUROY, a town of Hindoostan, in Myfore; 13 miles W. of Colar.

TAVARADO, a town of Portugal, in the province of Beira; 7 miles W.S.W. of Montemor o Velho.

TAVARES, a town of Portugal, in the province of Beira; 13 miles E. of Viseu.

TAVASTLAND, a province of Sweden, bounded on the N. by East Bothnia, on the E. by Savolax or the government of Kuopio, and the Russian government of Viborg, on the S. by Nyland, and on the W. by the government of Abo, or Finland Proper; about 150 miles in length from N. to S., and from 35 to 100 in breadth from E. to W. The country is very fertile, and consists of fine plains, watered by a great number of rivers and lakes, which abound in fish. It is diversified with arable and meadow lands; so that with respect to these natural advantages, it may not only be looked upon as the best part of Finland,

but is indeed scarcely surpassed in those particulars by any province in Sweden. It is likewise stored with cattle, fish, and all sorts of game. But notwithstanding this country is so fertile, it is far from being well cultivated; and, consequently, the peasants are generally very poor. Sometimes, indeed, the corn is much damaged by keen and unexpected frothy nights. The northern part of Tavastland is more mountainous and woody than the southern. In the morasses and uncultivated sandy wilds, a ferruginous earth is dug up, from which the Eisenand ertz, or iron sandy ore, as it is called, is prepared. The inhabitants subsist by agriculture, grazing, and breeding of cattle, and some of them are employed in the fisheries. They also traffic in corn, peas, beans, flax, hemp, dried fish, cattle, leather, tallow, butter, lime, the bark of trees, &c.

TAVASTHUS, or KRONEBERG, a town of Sweden, and principal place in the province of Tavastland, built in the year 1650, on a pleasant spot, by count Pebr Brahe, and endowed with considerable privileges. In 1713, this town was taken by the Russians; and in the last war between them and the Swedes, it was laid in ashes. The castle, which, exclusive of the town, is properly called "Tavasttheus," or "Tavasteborg," is well fortified, and serves for an arsenal and royal magazine; 80 miles N.N.E. of Abo. N. lat. 61° 1'. E. long. 24° 15'.

TAVAVIS, or THAOUAOUIS, a town of Asia, in Grand Bucharja; 15 miles N.E. of Bucharja.

TAUBATE', a town of Brasil; 130 miles W. of Rio Janeiro.

TAUBE, FREDERICK WILLIAM Von, LL.D., in *Bio-graphy*, was the son of Dr. Taube, physician to queen Caroline, consort of George II., and born in London in the year 1728. After the queen's death, the father settled at Zelle, where he died in 1742; and in the following year his son was entered at the university of Gottingen. Here he assiduously applied to the study of jurisprudence; and before he left the university, being in his 19th year, he published a dissertation "De Differentiis Juris civilis a jure Naturæ," intended to prove that the principles of the Roman, Canon, and German law were contrary to the law of nature, and inconsistent with the rights of man. When he quitted the university, in the year 1747, he travelled into foreign countries, and particularly through some parts of Africa and America. On his return he practised the law at Gottingen, but finding, in consequence of some displeasure which he had excited by the freedom with which he censured the tediousness of law-suits, that he had no prospect of advancement, he removed to Vienna in 1756, where he obtained some preferment in the army. Soon after an engagement in which he was wounded during the seven years' war, he abandoned Lutheranism, and embraced the tenets of the church of Rome, hoping thus to rise in the Imperial service. Having given proof of his talents and fidelity in an honourable office, which he occupied, and being acquainted with the English language, he was appointed secretary to the Imperial ambassador at the court of London, and repaired thither in October, 1763. Here he married a niece of the celebrated Dean Tucker, with whom he lived in habits of intimacy and friendship. In 1766 he returned to Vienna, and was appointed secretary to the council of trade, which was an office of great fatigue, on account of the journeys which it obliged him to take to distant places. When this college was dissolved, in 1776, he retired to Brussels. Having fulfilled another confidential commission with which he was entrusted, he returned from Belgrade to Vienna in 1777, and was ennobled by the emperor, and appointed a member of the government of Lower Austria. His health being

being much impaired, required an attention which it did not suit his inclination or occupation to give it: his disorder, which was an inflammation of the lungs, increased, and terminated his life in June, 1778, in the 50th year of his age. He was justly honoured for his integrity, his zeal to serve his friends, and his liberality. His literary labours evince the extent of his learning and researches. His principal works are the tract already mentioned; "Thoughts on the present State of our Colonies in America, on their Behaviour to the Mother-Country, and on the true Interest of the Nation in regard of the Colonies," London, 1766; "Historical and Political Sketch of the present State of the English Manufactures, Trade, Navigation, and Colonies, &c." 1774, 8vo.; "History of the English Trade, &c. from the earliest Periods till the Year 1776, with an authentic Account of the true Causes of the present War with North America," 1776, 8vo.; "J. J. Schetzen's Elements of Geography, improved and enlarged," 1786, 8vo.; "Historical and Geographical Description of the Kingdom of Sclavonia and Duchy of Symria, &c. in three parts," 1777, 1778; "An Account of various New Discoveries, made in 1776 and 1777, in Sclavonia, &c. &c." Leipzig, 1777, 4to. He contributed also, between the years 1773 and 1778, to Buching's periodical publications: He also communicated to the Royal Society of London "A short Account of a particular Kind of Torpedo found in the River Danube, with several Experiments on that Fish," published in the Phil. Transf. for 1775. Gen. Biog.

TAUBE, in *Geography*, a river of Westphalia, which runs into the Aland, near Seehausen.

TAUBER, a river of Germany, which rises about eight miles S. of Rotenburg, in Franconia, and runs into the Maine at Wertheim.

TAUBER See, a lake of Bavaria; 6 miles W. of Berchtesgaden.

TAUCAEL, or TUCHEL, a town of Prussian Pomerania. This town was taken and burned, in the year 1320, by the Teutonic knights, and afterwards rebuilt; 44 miles S.S.W. of Dantzic.

TAUCHA, a town of Saxony, in the circle of Leipzig. This town was built in the year 1221, by Albert, archbishop of Magdeburg, afterwards rebuilt, and in the year 1431 destroyed by the Bohemians and Hussites, when most of the inhabitants removed to Leipzig; 6 miles N.E. of Leipzig. N. lat. 51° 22'. E. long. 12° 30'.

TAUCHIRÆ, in *Ancient Geography*, a town of Africa, in Libya, belonging to the territory of Barcé, according to Herodotus, afterwards called Arsinoe. M. D'Anville supposes that it is the present Teukéra.

TAVDA, in *Geography*, a river of Russia, which rises in Pelim lake, and runs into the Tobol, 40 miles S. of Tobolsk.

TAUDECONDA, a town of Hindoostan, in Golconda; 25 miles S.W. of Warangole.—Also, a town of Hindoostan, in Dindigul; 7 miles N. of Dindigul.

TAUDENNY, or TUDENNY, a Moorish and Negro town or village, on the borders of the Desert in Africa; at which place are large ponds or beds of salt, which both the Moors and Negroes purchase, as well as dates and fig-trees of a large size. The salt-beds are about 5 or 6 feet deep, and from 20 to 30 yards in circumference. The salt comes up in red lumps mixed with earth, and part of it is red; 270 miles N.N.W. of Tombuctoo. N. lat. 21° 15'. W. long. 1° 25'.

TAUDOON, a town of Hindoostan, in Lahore; 34 miles S.S.E. of Nagercote.

TAVE, a river of France, which runs into the Rhone, about 6 miles below London.

TAVE, or Taff, a river of Wales, which runs into the sea, near Llaugharn.—Also, a river, which rises in two streams in the southern part of Brecknockshire, and runs into the Severn below Cardiff.

TAVERA, a town of Corfica, 18 miles N.N.E. of Ajazzo.

TAVERA di Orta, a town of Naples, in Capitanata; 14 miles S.S.W. of Afcoli.

TAVERNA, a town of Naples, in Calabria Ultra, formerly the see of a bishop, transferred to Catanzaro; 15 miles N. of Squillace.

TAVERNER, JOHN, in *Biography*, an eminent musician, who flourished in the early part of the 16th century. He is often mentioned by Morley among our early contrapuntists, and by Anthony Wood, as having begun his career by being organist of Boston, in Lincolnshire. At the establishment of Cardinal college, now Christ-church, Oxford, by cardinal Wolfey, he was appointed organist there; but narrowly escaped martyrdom for heresy, having held frequent conversations with some Lutherans on the abuses of religion. They were all imprisoned in a deep cave under the college, used for the keeping of salt-fish, of which the stench occasioned the death of some of them, and some were burnt in Smithfield.

Taverner had not gone such lengths as many of the fraternity; the suspicions against him were founded merely on his having hidden some heretical books under the boards of the school where he taught, for which reason, and on account of his professional eminence, the cardinal excused him, saying "he was but a musician," and so he escaped.

A set of books containing masses and motets to Latin words, some of which were composed in the time of Henry VII., and all before the Reformation, is preserved in the music-school at Oxford. These volumes contain compositions by John Taverner, Dr. Fayrfax, Avery Burton, John Marbec, William Kafar, Hugh Ashton, John Norman, John Sheppard, and Dr. Tye. The pieces by the three or four last are entered in a more modern hand, with different characters, and paler ink. The chief parts of the compositions are transcribed in a large, distinct, and fine hand and character; but bars not having been yet introduced, and being all *ad longam, alla breve*, or in *tempo di Capella*, the ligatures, prolations, and moods, render these books extremely difficult to read, or transcribe in score. However, by dint of meditation and perseverance, we arranged the parts under each other, of several movements by all these founders of our church music, particularly John Taverner, Dr. Fayrfax, and Dr. Tye; having scored an entire mass by each of them: as they are the most ancient and eminent of these old masters, in whose compositions the style is grave, and harmony, in general, unexceptionable, if tried by such rules as were established during their time; but with respect to invention, air, and accent, the two first are totally deficient.

The compositions, however, of these early English masters, have an appearance of national originality, free from all imitation of the choral productions of the continent. Few of the arts of canon, inversion, augmentation, or diminution, were as yet practised by them: short points of imitation are sometimes discoverable, but they seem more the effects of chance than design: and to characterise the chief of these composers in the order they have been named; Taverner and Fayrfax have but little design and no melody in their compositions; and it seems as if they should not have

have been ranked, as they are by Morley, with those of a much higher class, at a later period.

We can venture to give a character of Taverner, from an actual survey of his principal works which have been preserved, and which we have taken the pains to score. This author is in general very fond of slow notes, so that all his pieces which we have seen, are *ad longam*, or, at quickest, *alla breve*. Long notes in vocal music, unless they are to display a very fine voice, have little meaning, and are wholly destructive of poetry and accent; but our old composers have no scruples of that kind; and being as great enemies to *short* syllables, as to *short* notes, exercised the lungs of a singer as frequently upon one as the other.

As the first essays at harmony were made in extemporary discant, upon a plain-song, so in written counterpoint, it was long a favourite and useful exercise, to build the several parts of a movement upon some favourite chant, making it the ground-work of the composition. And this custom answered several purposes: it excited ingenuity in the construction of the parts; it regulated and restrained the modulation within the ecclesiastical limits; and as the plain-song had been long used in the church, by the priests and people, it was still easy for the musical members of the congregation, to join the chorus in singing this simple and essential part, while the choristers and choirmen by profession, performed the new and more difficult melodies, which had been superadded to it by the composer. The first reformers, or at least their followers, who were perhaps no great musicians, wished to banish every species of art from the church; and either retaining small portions of ancient chants, or making melodies, in the same plain and simple style, for their hymns and psalms, threw aside all figurative harmony and florid counterpoint; and sung in notes of equal duration, and generally in mere unison, those tunes which are still retained by the Calvinists, and in most of the reformed churches of Christendom. At the latter end of the fifteenth, and during the whole of the sixteenth century, as some chant or tune was the foundation upon which the harmony of almost every movement of a mass or motet was built, the additional parts were the superior, medius, counter-tenor, tenor, to which was given the plain-song in square black notes, of equal lengths to semibreves in *alla breve* time, and basses. The close or final movement of one of these masses is inserted in Burney's General History of Music, vol. ii. p. 557.

TAVERNES, in *Geography*, a town of France, and chief place of a canton, in the department of the Var, and district of Brignolles. The place contains 1536, and the canton 4529 inhabitants, on a territory of 280 kilometres, and 9 communes; 3 miles N. of Barjols.

TAVERNIER, JOHN BAPTIST, in *Biography*, a distinguished traveller, was the son of a native of Antwerp, and born at Paris in the year 1605. The frequent inspection of the maps and charts sold by his father, inspired him with a passion for travelling; so that at the age of twenty-two he had made tours through France, England, the Low Countries, Germany, Switzerland, Poland, Hungary, and Italy. In his business as a jeweller he was eminently skilful; and he employed 40 years in six journeys in Turkey, Persia, and the East Indies, by all the practicable routes. Having acquired great wealth, on his return from his sixth journey in 1668, he determined as a Protestant to live under a free government; and, with this view, purchased the barony of Aubonne, near the lake of Geneva. But having suffered very considerable loss of property by the misconduct of a nephew, he sold his barony in 1687, and commenced a se-

venth journey, which terminated his life at Moscow in 1689, at the age of 84. Destitute of talents for writing, he employed Sam. Chappuzeau of Geneva to arrange his memoirs, which is said to have been no easy task. The fruit of this labour was given to the public in two volumes, describing his six journeys, in 1679; and another was added in 1681, by La Chapelle, containing an account of Japan and Tonquin, with a history of the colony of the Dutch in the East Indies. These memoirs of Tavernier, notwithstanding reflections on his veracity, and charges of plagiarism, have been often cited as authority by later writers. Gibbon represents him as "the jeweller who saw so much and so well." Bayle. Moreri. Gen. Biog.

TAVERNIER *Key*, in *Geography*, a small island on the north coast of Cuba, near Tortuga.

TAVERNY, a town of France, in the department of the Seme and Oise; 6 miles E. of Pontoise.

TAVETCH, a community which, with that of Distentis, forms one of the high jurisdictions of the Grey League in Switzerland. These two communities occupy the western extremity of the valley of Sopra Selva, stretching as far as the confines of Uri. Tavetch is a pleasant valley, lying at the foot of the Alps, which separate the Grisons from the canton of Uri. The villages are numerous, consisting of scattered cottages chiefly constructed of wood. This valley produces pasture, hemp, and flax, and a small quantity of rye and barley. The trees are chiefly firs and pines, and their number gradually diminishes towards the extremity of the vale.

TAVETSCHIE, a town of the country of the Grisons; 13 miles from Ilantz, the capital.—Also, a mountain of the same country; 5 miles S.W. of Ilantz.

TAUFFERS, a town of the county of Tyrol; 6 miles S.S.W. of Glurentz.

TAUGHT, or TAUT, *Tight*, in the *Sea Language*, denotes the state of being extended or stretched out. Thus they say, *set taught* the shrouds, the stays, or any other ropes, when they are too slack and loose.

TAVI, in *Geography*, a town of Sicily, in the valley of Noto; 7 miles N.E. of Castro Giovanni.

TAVIANO, a town of Naples, in the province of Otranto; 11 miles W.N.W. of Alesano.

TAUJEPUR, a town of Bengal; 60 miles S.S.W. of Calcutta. N. lat. 21° 52'. E. long. 87° 45'.—Also, a town of Bengal; 32 miles E. of Purneah. N. lat. 25° 48'. E. long. 88° 11'.—Also, a town of Hindoostan, in Bahar; 15 miles N. of Chuprah. N. lat. 26° 2'. E. long. 84° 50'.

TAVIGNANO, a river of Corsica, which runs into the sea, 15 miles S. of Cervione.

TAUILA, a town of Arabia, in the province of Yemen; 24 miles W. of Tana.

TAUILLE, a town of Egypt, on the Nile; 2 miles N. of Mansora.

TAVIRA, or TAVILA, a sea-port town of Portugal, in the province of Algarve, surrounded with walls, and defended by a castle; the harbour is protected by two forts. It contains two churches, an hospital, five convents, and about 5000 inhabitants; 111 miles S.S.E. of Lisbon. N. lat. 37° 5'. W. long. 7° 35'.

TAVISTOCK, an ancient borough and market-town, in a hundred of the same name, in the county of Devon, England, is situated on the banks of the river Tavy, 34 miles W.S.W. from Exeter, and 206 miles in the same bearing from London. Its origin and growth seem to have arisen from the foundation and establishment of a magnificent abbey in the tenth century, by Ordgar, earl of Devon, and his

his son Ordulph. Within thirty years after its foundation, this abbey was burnt by the Danes, but was soon afterwards rebuilt, and became more flourishing than before. By a charter granted by Henry I., it appears that he bestowed "the jurisdiction, and the whole hundred of Tavistock," upon the abbey, together with the privilege of a weekly market, and a three-days' fair. This charter is recited and confirmed by one granted 21 Edw. III. The riches of the abbey progressively increased; and Richard Barham, the thirty-fifth abbot, obtained from Henry VIII. the privilege of sitting in the house of peers, or, in other words, was mitred. His patent was dated January 23d, 1513; but the honour continued only till the year 1539, when John Peryn, the thirty-sixth abbot, surrendered the abbey to the crown, and had a pension of 100*l.* per annum. The possessions of the abbey, with the borough and town of Tavistock, were given by the king to John, lord Russell, whose descendant, the present duke of Bedford, is now proprietor. Various fragments of the abbey still remain, but are, for the most part, incorporated with other buildings. The abbey church is described by Leland as 126 yards in length; the cloisters as extensive; and the chapter-house as a most magnificent structure: but all these have long since been completely demolished. Several buildings, that seem to have belonged to the abbey, are now used for warehouses; and adjoining to the principal inn is a large, handsome, arched gateway, ornamented with lofty pinnacles, apparently of the time of Henry VI. The town of Tavistock is large and populous; but the streets are narrow, and indifferently paved; and many of the houses have an appearance of age. The river is here crossed by two bridges, and after storms of rain, by flowing over various ledges and masses of rock, presents a very tumultuous spectacle. The church is a spacious edifice, consisting of four aisles, a chancel, and a tower at the west end, raised on arches. Within the church are preserved some human bones of a gigantic size, which were found in a stone coffin, dug out of the ruins of the abbey, and are said by tradition to be those of Ordulph, whom William of Malmesbury represents of such immense stature, that he could stride over rivers ten feet wide! Tavistock is a borough by prescription, and has sent two members to parliament from the 23d year of Edward I. The right of election is in the freeholders resident in the borough. The town is one of the stannaries of Devonshire, but does not appear to have been incorporated. It is governed by a portreeve, who is elected annually at the court of the lord of the manor. The population of the parish, according to the return of the year 1811, amounted to 4723; the number of houses to 514. Many of the inhabitants are employed in the manufacture of serges for the East India Company. Five fairs are held annually, and a weekly market on Saturdays. An institution for the study of Saxon literature existed in Tavistock at a very early period, and lectures were read in that language in a building purposely appropriated, and called the Saxon school. These lectures were discontinued about the time of the reformation. Several of the abbots were learned men; and the encouragement they gave to literature is evident, by the establishment of a printing-press in the abbey within a few years of the time when the art was brought into England. Among the books that issued from this press was Walton's translation of "Boethius de Consolatione," "emprinted in the exempte Monastery of Tavestoke in Denshyre, by me Dan Thomas Rychard, monke of the said Monastery," 1525, 4to.; and the "Confirmation of the Tynners Charter," 26th of Henry VIII., 16 leaves, 4to. Bishop Gibson also mentions a Saxon Grammar as having been printed here about the commence-

ment of the civil wars; but this assertion is supposed by other antiquaries to be unfounded.

Among the more eminent natives of Tavistock was Sir Francis Drake, one of the most distinguished seamen that Britain ever produced, and the first Englishman that circum-navigated the globe.

Morwell-house, about three miles from Tavistock, was the hunting-seat of the abbots of Tavistock; and from its situation near Morvel-down, and the woods on the banks of the Tamar, was well adapted for this purpose. Its form is quadrangular, with a large arched gateway in front, ornamented in a similar manner to those of the abbey. The vaulted ceiling of this entrance has several coats of arms sculptured in moor-stone. At a little distance is Morwell-rock, which rises almost perpendicularly to an immense height from the bed of the Tamar.

About four miles north of Tavistock is Bren-Tor, a vast mass of craggy rock, which shoots up from the road between Tavistock and Lydford, and becomes a very conspicuous sea-mark to mariners in the British Channel, though more than 20 miles distant. The summit is frequently enveloped in clouds, but in fair weather commands an extensive prospect, and the ships in Plymouth harbour may be distinctly seen from its summit. Near the top is the parish church of the little village of Brent, which, like most of the churches in similar situations, is dedicated to St. Michael. On Dartmoor, about three miles east of Tavistock, are several masses of rock, and also the remains of Druidical circles and avenues.—Beauties of England and Wales, vol. iv. Devonshire, by J. Britton and E. W. Brayley.

TAVIUM, or TAVIA, in *Ancient Geography*, a town of Asia, in Galatia, and capital of the Trocmi, according to Ptolemy, Strabo, and Pliny.

TAULACUM, in *Natural History*, a name given by the people of the East Indies to a species of orpiment, which is very common with them.

It is of a dirty yellow colour, and is composed partly of an irregular mass, partly of fine flakes, like scales of fishes. These are of the best colour. The whole mass, on being exposed to the fire, burns, and emits copious fumes; but it does not melt readily. After it has been several times calcined, the Indians give it internally in intermittent fevers, with safety and success. Woodw. Catal. Foss. vol. i. p. 24.

TAULE', in *Geography*, a town of France, in the department of the Finisterre; 3 miles N.W. of Morlaix.

TAULE, a town of Hindoostan, in Mysore; 47 miles E. of Seringapatam.

TAULIGNAN, a town of France, in the department of the Drôme; 12 miles S.E. of Montelimart.

TAUMACO, a town of Greece, in the province of Theffaly; 18 miles N.W. of Zeiton.

TAUMAGO, an island in the Pacific ocean, discovered by Quiros, in 1606; about 24 or 25 miles in circumference. The island abounded with bananas, cocoa-trees, and palms: it produces also sugar-canes, and many kinds of nutritious roots. The fleet here obtained, without difficulty, refreshments, water, and wood, of which it stood in great need. The Spaniards lived on good terms with the natives, who were eager to procure them all the assistance that their island afforded; nor was peace infringed till the very moment of their departure. Thinking that it would be of service in the remainder of their voyage, to have some Indians on board, who might act as guides or interpreters, the Spaniards seized four whom they carried on board by force. Their chief was soon informed of it, and came to demand them in the most earnest manner; but they were refused,

and war was instantly declared. A fleet of canoes came out to attack the Spanish ships, which their fire-arms quickly dispersed, and would totally have destroyed, had not these brave islanders, with all their courage, been sensible of their inferiority. S. lat. 10°. E. long. 169° 25'.

TAUME, a river of England, which rises in the county of York, and runs into the Mersey, in Lancashire, opposite Stockport.

TAUNA, a town of Egypt, on the Bahir Joseph, or Canal of Joseph, which forms a communication between the Nile and the Birket el Kerum; 5 miles S.W. of Ashmunein.

TAUNDA, a town of Hindoostan, in Oude; 50 miles S.E. of Fyzabad. N. lat. 26° 32'. E. long. 82° 53'.

TAUNNA, a town of Hindoostan, in Oude; 30 miles W. of Lucknow.

TAUNT, a sea-term, signifying high or tall. When the masts of a ship are too tall for her, the sailors say, she is *taunt-masted*.

TAUNTON, in *Geography*, a considerable market-town and borough, in the hundred of Taunton-Dean, county of Somerset, England, is situated on the high road between Bath and Exeter, 52 miles S.W. from the former city, 32 miles N.E. from the latter, and 144 W. by S. from London. It was anciently called Thonodunum, or the Town of the Tone, by which river it is watered. Taunton is unquestionably a place of remote antiquity: from the discovery of coins and other relics, there is reason to suppose it was not unknown to the Romans; but it is certain it was of great note in the time of the Saxons. For Ina, a West-Saxon monarch, built a castle here for his residence in the year 700, which was destroyed in 722 by his queen Ethelburga, who prevailed on him to resign the crown, and retire to a monastery. A new castle, on the site of the former, was erected by William Giffard, bishop of Winchester in the time of Henry I. By various documents of the bishops of that see, dated Taunton castle, it seems to have been a place of their frequent residence. In 1495 the whole building was repaired, and an embattled gateway built by bishop Thomas Langton. Though the building has been much modernized, this gateway still remains. Considerable improvements were made in 1577, by bishop Robert Horn, who likewise built the great hall as it now stands, in which the assizes, county sessions, and bishop's courts are held: it is 119 feet in length, 30 in width, and 20 in height. The other apartments are applied to various public uses. The whole castle occupied a front of 195 feet, with a circular tower at each end, of which only one is now remaining. Taunton had a distinguished share in the various civil commotions of this kingdom: in the contests of the Saxon kings; in the civil wars between the houses of York and Lancaster; and in the insurrection in favour of Perkin Warbeck, in Henry VII.'s reign. In the civil wars of Charles I., it became an object of vigorous struggle between the royal and parliamentary forces which should possess its fortrefs, it being considered as the key to the west of England. It was also deeply involved in the rebellion of the duke of Monmouth, who here assumed the title of king, and was publicly proclaimed.

The town of Taunton, in point of size, buildings, and respectability of inhabitants, may vie with most cities. It contains two parishes, extends nearly a mile from east to west, and consists of four principal streets, which are well built, and of commodious width. Though ancient and populous, it was not incorporated till the reign of Charles I., 1627. It did not long enjoy this privilege; for Charles II., on his restoration, out of resentment for the town's adherence

to the parliament against his father, deprived it of its charter. It continued disfranchised 17 years, when the king granted it a new charter. The corporation consists of a mayor, recorder, a justice of the peace, two aldermen, ten capital, and ten inferior burgesses. The justice is always the last mayor, who, with the two aldermen, are annually elected out of the capital burgesses; and the vacancies occasioned by this election are filled up from the inferior members of the corporation. The officers are a town-clerk, two sergeants at mace, a bell-man, and a beadle. There are acting under the mayor, and sworn in by him, two constables and six tything-men or petty constables, who, with two port-reves and two bailiffs, are annually chosen by a jury, and are, properly speaking, the officers of the bishop of Winchester, in whose court they are elected. The mayor's officers cannot arrest within the borough; and there being no prison, except a kind of town-bridewell called the Nook, debtors are sent to the county gaol at Hechester. Though the town has for ages been flourishing, and of great importance in the county, yet the corporation has neither land, houses, nor joint stock in money; their charter excluding them from such possessions.

Taunton is an ancient borough by prescription, and has returned two members to parliament from the year 1294, 23 Edward I. The right of election is vested in a description of people called pot-wablers, or pot-wabloners. These are all such inhabitants as reside within the borough, and boil their own pots, provided they are not paupers, and have not received relief from the fund of any charity within a year. The number of voters is estimated at about 500. The bounds of the borough, to which the right of election is limited, are small in proportion to the town, comprehending only a part of the parish of St. Mary Magdalen. The principal article of trade in Taunton is the woollen manufacture, which has flourished to a great extent almost ever since its introduction into England by the famous John Kempe, the first manufactory being established so early as the year 1336. Upwards of one thousand looms are said to have been employed at one time; but the trade is now greatly reduced, and the population decreased: houses in the suburbs have fallen to ruin, and have been destroyed. A large silk manufactory was established in the year 1780. Two large markets are held on Wednesday and Saturday, and here are two annual fairs. By the population report of the year 1811, Taunton was stated to contain 1371 houses, and 6997 inhabitants.

The edifices for religious worship in this town are two parish churches, and five dissenting meeting-houses. The church of St. Mary Magdalen is a spacious beautiful structure, with a lofty and strong tower of excellent workmanship, of the florid style, having four stately pinnacles thirty-two feet high, making the whole height 153 feet. This tower has thirteen handsome windows, with a variety of curious prominent ornaments, that give the whole an air of magnificence, united to a delicate elegance, not to be equalled in the county, nor perhaps in the kingdom. It was probably erected by Henry VII., who, when he came to the crown, rebuilt many of the churches in Somersetshire, as a reward of the attachment of the county to the Lancastrian party. The inside of the church is answerable to the exterior, and makes a grand appearance. Its curious roof is supported by twenty-four pillars, in four rows, dividing it into five aisles and a chancel. There are forty-four windows, some of which have painted glass. The other church, St. James's, though every way inferior to the former, is a strong, plain, ancient structure, supposed to have been built in the 13th century. The meeting-houses are St. Paul's, and the new meet-

ing, for Protestant dissenters; one for Baptists, one for Quakers, and one for Wesleyan Methodists. The buildings for charitable purposes are, a free grammar-school, founded by Richard Fox, bishop of Winchester, about the year 1500; two large and well endowed alms-houses, founded in the 17th century, by Mr. Robert Graye and Mr. Richard Huish; two other alms-houses, on a smaller scale; two work-houses; and an hospital, the most capital of its kind in the county: it is a square structure, 90 feet on a side; contrived to admit through every part a free circulation of fresh air; and forming on the whole a commodious receptacle for the diseased. The first corner-stone was laid by lord North in 1772, and the building was completed in 1774. In the centre of the town is a spacious building, erected in 1772, under the sanction of an act of parliament; the lower part is the market-house, over which is the town-hall, where the borough sessions are held.

On the east part of the town was a priory for Black canons, founded in 1127, by bishop Giffard: at the dissolution, it was granted to Matthew Colehurst. A leper-house was also founded about the year 1280, by Thomas Lambritz; and a house of White or Carmelite friars, in 1322, by Walter de Meryet. Both these houses are supposed to have been private property previous to the dissolution.—Collinson's History of Somersetshire, vol. iii. Toulmin's History of the Town of Taunton; 4to. 1791. Maton's Observations on the Western Counties of England, vol. ii. 8vo. 1797.

TAUNTON, a river of Massachusetts, which runs into the sea at Rhode island, N. lat.  $41^{\circ} 24'$ . W. long.  $71^{\circ} 10'$ .—Also, a town of Massachusetts; 29 miles S. of Boston. N. lat.  $41^{\circ} 48'$ . W. long.  $71^{\circ} 2'$ .—Also, a river of America, in the province of Maine, which runs into the sea near New Bristol.

TAUNTON-DEAN, a valley of England, extending about thirty miles in length, in the county of Somerset, of fertility and produce equal to almost any in the kingdom. It takes its name from Taunton, the principal town.

TAVOLADOTO, a small island near the east coast of Sardinia. N. lat.  $40^{\circ} 54'$ . E. long.  $9^{\circ} 5'$ .

TAVOLARA, a small island near the east coast of Sardinia. N. lat.  $40^{\circ} 52'$ . E. long.  $10^{\circ} 5'$ .

TAVORA, a river of Portugal, which runs into the Duero, 5 miles N.E. of Lamego.—Also, a town of Portugal, in the province of Beira; 6 miles E. of Lamego.

TAVOYVOVEL, a small island near the east coast of Lewis. N. lat.  $58^{\circ} 6'$ . W. long.  $6^{\circ} 29'$ .

TAURAGUR, a town of Hindoostan, in Lahore; 24 miles W.N.W. of Nogaroot.

TAURASI, a town of Naples, in Principato Ultra; 12 miles S.E. of Benevento.

TAURASIA, in *Ancient Geography*, a town of Italy, in Gallia Transpadana.

TAURAT, in *Geography*, a town of the island of Cuba; 38 miles N.N.E. of St. Jago.

TAUREA, among the Romans, a punishment inflicted by whipping with scourges made of bulls' hides.

TAUREAU, in *Geography*, an island on the French coast, with a fort to defend the harbour of Morlaix.

TAUREE, a town of Bengal; 35 miles S.S.E. of Ghidore.

TAURESIIUM, in *Ancient Geography*, a town of European Dardania, on the other side of the territory of Duras; the birth-place of Justinian, who founded here a magnificent town, called after his own name.

TAURI *liberi libertas*.—In some ancient charters, *taurus liber* signifies a common bull kept for all tenants within such

a manor, or liberty.—“Cum libertate faldiz, liberi tauri, et liberi apri, &c.” See *Free BULL*.

TAURI, in *Ancient Geography*, a people of Sarmatia, in the vicinity of Scythia. According to Herodotus, these people had a custom of sacrificing to Iphigenia, the daughter of Agamemnon, the strangers whom chance threw on their coasts, and also the Greeks who fell into their hands.

TAURIA, *Ταυρία*, in *Antiquity*, a festival in honour of Neptune. Pot. Archæol. tom. i. p. 432.

TAURIA, in *Ancient Geography*, an island of the Mediterranean sea, between New Carthage and Cæsarea of Mauritania. Anton. Itin.

TAURIANA, a town of Italy, in Brutium.

TAURICA CHERSONESUS. See *CHERSONESUS Taurica* and *CRIMEA*.

TAURIDA, TAURICHESKAIA, or *province of Tauris*, in *Geography*, a province of Russia, being part of the government of Catherinenslaf or Ecaterrinenlaf or Ekaterinoflav, bounded on the N. by the rivers Dnieper and the Konksija, on the W. and S. by the Black sea, and on the E. by the sea of Azoph. This fertile peninsula, which is the great mart of commerce in the Black sea, was colonized for the purposes of trade by the Greeks, Romans, Genoese, occupied by the Turks under Mahomet II., and governed by the khan of the Tartars, a vassal to the Porte. On the peace of Kninardi, in 1774, it was declared an independent sovereignty, taken possession of by Catharine II. on the abdication of the khan Sahin Gerai, in 1783, and confirmed to Russia by the Porte in the same year by the treaty of Constantinople. The empress revived several of the ancient Greek names. M. Pallas has exhibited an animated and delightful picture of this province in his account of a journey made in 1794, for which we refer to Tooke's Russia, vol. i. For a farther account of it, see *CRIMEA*. See also *RUSSIA*.

TAURIDA, *Mountains of*, are extended and lofty, forming the southern side of the province, and the shore of the Euxine sea. The range extends from Theodosia in a straight line westwards, quite up to Balbeck. At Karafobafar two towering pinnacles shoot up, and at Akmelchat a very elevated one, called Aktau. The smaller mountains stand distinct and scattered. It is very probable that this range is partly a continuation of the Caucasian, and partly of the Carpathian mountains; and that these two principal chains are connected by it; which also seems apparent from the nature and qualities of the mountains opposite to those of Taurida, which extend beyond the Danube, through Bulgaria, and are called Pulkanian. The greater part of these mountains of Taurida consists of chalk-masses with petrifications, and many beds of sand and marle, and chalk-hills with flints. Hence it is presumed that they are not to be classed with the original, but only with the alluvial or deposited mountains. A part of them is thought to owe its origin even to the subterranean fires. Whether this be the case or not, it is said that lead, copper, and iron ores are found in them, as well as jasper, agate, and mountain crystal. They are very rich in lime-stone, marble, slate, sand-stone, coals, naphtha, and common salt. The isle of Taman consists merely of beds of sand and marle, without lime-stone. The height of the Taurida mountains is moderate; and they are in a great degree destitute of forests. The trees that grow upon them are those of the richest foliage, such as oak, beech, chestnut, &c. But what they want in wood is made up very amply by the rich and beautiful herbs of the vallies. The rivers that take their rise from these mountains are the Alma, Katsha, Kabarda, Salgyr, Karussu, and many lesser streams, that form pleasing natural cascades.

**TAURILIA**, among the Romans, games in honour of the infernal gods. They were otherwise called *ludi taurii*.

**TAURINIA**, in *Ancient Geography*, a town of European Sarmatia, in the peninsula called "Curfus Achillis." Steph. Byz.

**TAURIS**, in *Geography*. See **TABREEZ**.

**TAURISCI**, in *Ancient Geography*, a Celtic people, who were established along the Danube. They were separated from the Scordisci by a mountain called by Pliny Mons Claudius.

**TAURO**, a town of European Sarmatia, in the peninsula of "Curfus Achillis." Suidas.

**TAUROBOLIUM**, or **TAUROBOLION**, among the *Ancients*, sacrifices of bulls, which were offered to Cybele, the mother of the gods, to render thanks to the goddess of the earth, for her teaching men the art to tame those animals, and fit them for labour.

The Taurobolium was a kind of sacrifice of expiation and purification; of which no trace occurs before the reign of Antonine, and which seems to have terminated under Honorius and Theodosius the younger. It was principally employed in the consecration of the priests of Cybele.

**TAVRO-CASTRO**, in *Geography*, a town of Greece, in Livadia; 20 miles N.N.E. of Athens.

**TAUROCINIUM**, in *Ancient Geography*, a river of Italy, in Magna Græcia; and the people who lived upon its banks in the vicinity of the town of Rhegium, were called Taurocini.

**TAUROCOLLA**, *Bull-Glue*, a sort of glue much used among the ancients in works that required strength, being accounted far stronger than any other kind. It was made by boiling down the ears and genital parts of a bull in water.

**TAUROENTUM**, in *Ancient Geography*, a colony founded by the ancient Marseilloise on the sea-shore, to the right of the entrance into the bay of Ciotat.

**TAUROGEN**, in *Geography*, a town of Samogitia; 30 miles S.W. of Rofenne.

**TAUROMENIUM**, in *Ancient Geography*, a town of Sicily. See **TAORMINA**.

**TAUROPOLIA**, in *Antiquity*, feasts celebrated in honour of Diana and Apollo, in the Icarian isles, viz. those of the Archipelago and of the Ægean sea.

**TAUROPOLIAN**, in *Ancient Geography*, the name of a temple situated in the isle of Samos; dedicated to Artemis, or Diana.—Also, a temple dedicated to Diana, in the isle of Icaria. Strabo.

**TAUROPOLIS**, a town of Asia Minor, in Caria.

**TAURUS**, in *Astronomy*, the *Bull*, one of the twelve signs of the zodiac, and the second in order.

The stars in the constellation Taurus, in Ptolemy's catalogue are 44; in Tycho's catalogue, 43; in Hevelius's catalogue, 51; in the Britannic catalogue, 141. See **CONSTELLATION**.

**TAURUS**, in *Ancient Geography*, a name given by the ancients to a chain of mountains, which commenced in Asia Minor, occupied the northern part of Cilicia, and proceeded to join, towards the north of Syria, mount Amanus; but afterwards the name has comprehended the mountains which reach from the Taurus of the ancients to the south of the Caspian sea.—Also, the name of a promontory on the eastern coast of Sicily. Ptolemy.—Also, a mountain of Scythia. It is a branch of mount Taurus that extends to the environs of the Palus Mæotides and the Caspian sea. Jornandes.—Also, a mountain of Germany, and a mountain of Æthiopia.—Also, a place of Palestine, at the entrance of the town of Jericho.—Also, a river of Greece, in the Peloponnesus.—Also, a river of Asia, in the vicinity of Pamphylia.—Also, the

name of one of the three canals by which the town of Alexandria, in Egypt, communicates with the sea.—Also, a place of Sicily, 60 stadia from the town of Syracuse.—Also, a marsh of Gallia Narbonensis.

**TAURUS**, in *Geography*, was a general name given by the ancients to any thing of a gigantic nature, and hence it has been applied to a celebrated range of mountains, which is said to extend from the Grecian Archipelago to the extremities of Asia. By Strabo it is thought to originate in Caria and Pamphylia; and by some modern geographers, on the coast of Cilicia, not far from Scanderon. However this be, it intersects Asia Minor from E. to W., and advancing in a N.E. direction, intercepts the course of the Euphrates, and spreads itself over the kingdom of Armenia, where it unites with mount Caucasus. It then detaches a variety of branches into Persia, of which the most conspicuous is that named Mont Zagros by the ancients. This long and lofty range formerly divided Media from Assyria, and now forms the boundary of the Persian and Turkish empires. It runs parallel with the river Tigris and Persian gulf, and almost disappearing in the vicinity of Gombroon, seems once more to rise in the northern districts of Kerman, and following an easterly course through the centre of Meckraun and Balouchistan, is entirely lost in the deserts of Sinde.

**TAURUS**, in some *Ancient Customs*, signifies a husband.

Leg. H. I. cap. 7. "Videtur autem matris ejus, cujus-que taurus alluserit."

**TAURUS**, in *Entomology*, a species of *Scarabeus*.—Also, a species of *Cicada*, found in Coromandel.—Also, a species of *Cimex*.

**TAURUS**, in *Ornithology*, a name given by the ancients to the bittern or butter-bump, from its imitating the roaring of a bull in its noise.

**TAURUS**, in *Zoology*. See **BOS** and **BULL**.

**TAURUS Æthiopicus**, the *Æthiopian Bull*, an animal described in a very remarkable manner by Pliny; but so contrary to the course of nature, that we may very justly rank it among the other extraordinary animals, such as the mantichora and the vermis caruleus, of sixty or seventy feet in length.

**TAUSA**, in *Geography*, a town of Saxony, in the circle of Neustadt; 2 miles N. of Ziegenbruck.

**TAUSCHELIN**, a town of Bohemia, in the circle of Schlan; 10 miles W.N.W. of Schlan.

**TAUSCHIN**, a town of Bohemia, in the circle of Kaurzim; 7 miles S.E. of Kofteletz.

**TAUSEN, JOHN**, in *Biography*, called the "Danish Luther," because he was one of the first promoters of the reformation in Denmark, was born of parents who were peasants in the isle of Fyen, in the year 1499. Having finished his course of education, he became a monk in the convent of the order of St. John of Jerusalem, at Antooriskow, and here he ingratiated himself so much with the prior, that he obtained a pension for travelling into foreign countries, on condition that he should avoid Wittenberg, which was at that time the focus of heresy. In his progress he visited Louvain and Cologne, where he had an opportunity of perusing some of the works of Luther, with which he was so captivated, that he could not resist the inclination of proceeding to Wittenberg, notwithstanding the prior's interdiction. In this place he pursued his studies under the instruction of Melancthon with such success, that he was appointed to give public lectures on theology in the university of Copenhagen. In his convent, to which he was soon recalled, he frequently preached; and at length, viz. in 1524, publicly avowed himself a disciple of Luther. The conse-

quence

quence was his expulsion from the convent at Antoorfchow, and his retirement to another at Wiborg. As he here propagated his doctrine, he was imprisoned by the prior; but by this act of severity he was emboldened to proceed, and preached to the populace from a window. Being liberated in 1526, he was in the same year appointed chaplain to the king, and permitted to preach openly at Wiborg. He soon acquired a number of followers, who went to church armed, in order to protect him from the violence of the Papists. In 1529 he was invited to officiate in the church of St. Nicholas, at Copenhagen; and in the following year he attended, as director, at a conference which took place in that city between the Lutherans and the Roman Catholics. On the death of Frederic I. he was banished from Zealand, but being after a few days invited to return, he was appointed clergyman and lecturer in theology at Roschkind. In 1542 he was advanced to the episcopal chair of Ribe, and died in the year 1561. *Tausen*, besides an improved Danish translation of the Psalms, printed in 1544, and at Copenhagen in 1557, was the author of several works, consisting of Danish hymns, and treatises on the doctrine of Luther. A full account of his meritorious services may be found in Professor Munter's History of the Reformation in Denmark, &c. Gen. Biog.

**TAUSS**, or **DOMAZLITZ**, in *Geography*, a town of Bohemia, in the circle of Pilsen; 26 miles S.S.W. of Pilsen. N. lat.  $49^{\circ} 25'$ . E. long.  $12^{\circ} 52'$ .

**TAUSTE**, a town of Spain, in Aragon; 25 miles N.W. of Saragossa.

**TAUTENBURG**, a town and citadel of Saxony, in Thuringia; 3 miles S. of Camburg.

**TAUTICA**, in *Ancient Geography*, a town of Asia, in Media.

**TAUTOLOGICAL ECHOES**, are such echoes as repeat the same sound or syllable many times. See **ECHO**.

**TAUTOLOGY**, in *Grammar*, a needless repetition of the same sense in different words; or, a representation of any thing as the cause, condition, or consequence of itself. Of the first kind is that of Virgil:

“ ——— Si fata virum servant, si vespicitur aura  
Ætherea, neque adhuc crudelibus occubat unbris.”

Such also is this of Addison:

“ The dawn is overcast:—the morning lours;  
And heavily in clouds brings on the day.” Cato.

Here the same thought is repeated thrice in different words.

It is also considered as of the nature of tautology, to lengthen a sentence by coupling words altogether or nearly synonymous, whether they be substantives or adjectives, verbs or adverbs. This is a very common fault, and to be found even in our best writers. It should ever be remembered, as an invariable maxim, that words which add nothing to the sense or to the clearness, must diminish the force of the expression. There are two occasions, however, on which synonymous words may be properly used. One is, when an obscurer term, which we cannot avoid employing, on account of some connection with what either precedes or follows, needs to be explained by one that is clearer: the other is, when the language of the passions is exhibited. Passion dwells on its object; the impassioned speaker always attempts to rise in expression; but when that is impracticable, he recurs to repetition and synonymy, and thus produces in a degree the same effect. An adjective and its substantive will sometimes include a tautology. Moreover, in some single words, there is so much the appearance of tauto-

logy, that they ought, in prose at least, to be avoided; such are worse for worse, lesser for less, chiefest for chief, extremeft for extreme; Most Highest, as in the liturgy, for Most High. Campbell's *Philosophy of Rhetoric*, vol. ii.

**TAUVES**, in *Geography*, a town of France, in the department of the Puy de Dôme; 15 miles W. of Besse.

**TAUVO**, a small island on the E. side of the gulf of Bothnia. N. lat.  $64^{\circ} 50'$ . E. long.  $24^{\circ} 31'$ .

**TAVY**, a river of England, which rises in Devonshire, passes by Tavistock, &c. and joins the Tamar, two miles below Saltash.

**TAUZIM**. See **TEUSING**.

**TAW**, a river of England, which rises about three miles S.E. from Oakhampton, and runs into the Bristol channel below Appledore, forming a large bay at its mouth, called Barnstaple bay.

**TAW**, a town of Prussia; 23 miles W.S.W. of Tilsit.

**TAWALLY**, one of the Molucca islands, 25 miles long from north to south, and from 5 to 9 broad. S. lat.  $0^{\circ} 21'$ . E. long.  $127^{\circ} 14'$ .

**TAWANDEE CREEK**, a river of Pennsylvania, which runs into the E. branch of the Susquehanna, N. lat.  $41^{\circ} 45'$ . W. long.  $76^{\circ} 30'$ .

**TAWARRAN**, a town on the N.W. coast of the island of Borneo. N. lat.  $6^{\circ} 9'$ . E. long.  $116^{\circ} 15'$ .

**TAWAS**, Indians in the Ohio, on the river Miami of the Lake.

**TAWEE-TAWEE**, an island in the Sooloo Archipelago, 30 miles long, and from 3 to 10 broad. N. lat.  $5^{\circ} 15'$ . E. long.  $120^{\circ}$ .

**TAWING**, **SKINNING**, the art or manner of preparing or dressing skins in white, to fit them for use in divers manufactures, particularly for gloves, &c.

All kinds of skins may be tawed; but it is chiefly those of sheep, lambs, kids, and goats, that are used to be dressed this way, as being those fittest for gloves.

*Method of tawing or dressing skins in White.*—The wool or hair being well got off the skins by means of lime, &c. (as described under the article **SHAMMY**;) they are laid in a large vat of wood or stone, set in the ground, full of water, in which quick-lime has been slaked; in this they continue a month or six weeks, as the weather is more or less hot, or as the skins are required to be more or less soft and pliant.

While in the vat, the water and lime are changed twice, and they are taken out and put in again every day. When taken out for the last time, they are laid all night to soak in a running water, to get out the greatest part of the lime; and in the morning they are laid six together on the wooden leg, to get off the flesh by scraping them stoutly, one after another, on the flesh-side with a cutting two-handed instrument, called a knife; and while this is in hand, they cut off the legs, and other superfluous parts about the extremities.

This done, they are laid in a vat or pit with a little water; where, being well filled with wooden pestles for a quarter of an hour, the vat is filled up with water, and the skins are rinsed in it. They are next thrown on a clean pavement to drain; which done, they are cast into a fresh pit of water, where being well rinsed they are taken out, and laid on the wooden leg six at once, with the hair-side outermost, over which they rub a kind of whetstone very briskly, to soften and fit them to receive four or five more preparations given them on the leg, both on the flesh-side and the hair-side, with the knife, after the manner above-mentioned.

They are then put into a pit with water and wheat-bran, and stirred about in it with wooden poles, till the bran is perceived

perceived to stick to them, and then are left. After this, as they rise of themselves to the top of the water by a kind of fermentation, they are plunged down again to the bottom, and, at the same time, fire is set to the liquor, which takes as easily as if it were brandy, but goes out the moment the skins are all covered.

This operation is repeated as often as the skins rise above water; and when they rise no more, they are taken out, laid on the wooden leg, the flesh-side outermost, and the knife is passed over it to scrape off the bran. The bran thus cleared, the skins are laid in a large basket, where they are loaded with huge stones to promote their draining; and when sufficiently drained their feeding is given them, which is performed after the following manner: For 100 large sheep-skins, and for smaller in proportion, they take eight pounds of alum and three of sea-salt, melt the whole with water in a vessel over the fire, pouring the solution out, while yet lukewarm, into a kind of trough, in which are 20 pounds of the finest wheat-flour, with eight dozen yolks of eggs; of all this together is formed a kind of paste, a little thicker than children's pap, which, when done, is put into another vessel, to be used in manner following.

A quantity of hot water being poured into the trough in which the paste was prepared, two spoonfuls of the paste are mixed with it; in order to which they use a wooden spoon, which contains just what is required for a dozen skins; and when the whole is well diluted, two dozen of the skins are plunged into it, care being taken by the way, that the water be not too hot, which would spoil both the paste and hurt the skins. Having staid some time in the trough, they are taken out one after another with the hand, and stretched out; this is repeated twice; when they have all had their paste, they are put into tubs, where they are filled afresh with wooden pestles.

Then they are put into a vat, where they remain five or six days or more, and are at last taken out in fair weather, and hung out to dry on cords or racks; the quicker they dry the better, for if they be too long in drying, the salt and alum within them are apt to make them rise in a grain, which is an essential fault in this kind of dressing.

When the skins are dry, they are put up into bundles, and just dipt in fair water; from which being taken out and drained, they are thrown into an empty tub, and, after some time, are taken out, and well trampled under foot.

They are then drawn over a flat iron instrument, the top of which is round, like a battledore, and the bottom fixed into a wooden block, to stretch and open them: when opened, they are hung in the air upon cords to dry; and when dry they are opened a second time, repassing them over the same instrument.

Lastly, they are laid on a table, pulled out and laid smooth, and are thus in a condition for sale and use.

After the same manner are dressed horses', cows', calves' skins, &c. for the saddlers, harness-makers, &c., as also dogs', wolves', bears' skins, &c. excepting that in these the use of paste is omitted, salt and alum-water being sufficient. See TANNING.

By stat. 9 Ann. c. 11. and 10 Ann. c. 26. the following duties are imposed on hides or skins tawed or dressed in Great Britain. For horse-hides dressed in alum and salt, or meal, or otherwise tawed, 1*s.* 6*d.* a hide; hides of steers, cows, and all other (except horse-hides) dressed in alum and salt or meal, or otherwise tawed, 3*s.* a hide; calve-skins and kips, dressed in alum and salt or meal, or otherwise tawed, 1½*d.* a pound; skins so dressed or tawed with the hair on, 3*s.* a dozen, and without hair, 1*s.* a dozen; dog-skins so

dressed or tawed, 1*s.* a dozen; buck and doe-skins (except what paid the duty on importation) dressed in alum and salt or meal, or otherwise tawed, 6*d.* a pound; kid-skins so dressed or tawed, except as before, 1*s.* a dozen; goat-skins so dressed or tawed, 2*s.* a dozen; beaver-skins so tawed, 2*s.* a dozen; sheep-skins and lamb-skins so dressed or tawed, 1½*d.* a pound; and all other tawed skins, not before charged, 30*l.* for every 100*l.* value. All these duties are to be paid by the tawers or makers.

For hides and skins dressed in oil, 6*d.* a pound; deer, goat, and beaver-skins dressed in oil, 6*d.* a pound; calve-skins dressed in oil, 8*d.* a pound; sheep and lamb-skins dressed in oil, 3*d.* a pound; all skins dressed in oil, not before charged, 15*l.* in the 100*l.* according to the real value; all which are to be paid by the oil leather-dressers.

For other regulations, see LEATHER and TANNER.

TAWIXIWI, in *Geography*, a town of America, on the Miami. N. lat. 40° 35'. W. long. 84° 4'.

TAWNY, in *Heraldry*. See TENNET.

TAWY, in *Geography*, a river of South Wales, which rises in Brecknockshire, and runs into the sea at Swansea.

TAX, formed from τὰξίς, *order*, denotes a certain aid, subsidy, or supply, granted by the commons of Great Britain in parliament assembled, constituting the king's extraordinary revenue; and paid yearly towards the expences of the government. See MONEY-BILLS, PARLIAMENT, and SUPPLY.

Anciently, the tax seems to have been imposed by the king at his pleasure; but Edward I. bound himself, and his successors, from that time forward, not to levy it, but by consent of the realm.

To this purpose the celebrated Mr. Locke, in his "Essay on Government," (ch. xi. § 140.) lays down the following proposition as fundamental. "'Tis true, government cannot be supported without great charge; and 'tis fit every one who enjoys his share of protection, should pay out of his estate his proportion for the maintenance of it. But still it must be with his own consent, *i. e.* the consent of the majority, giving it either by themselves, or their representatives chosen by them: for if any one shall claim a power to lay and levy taxes on the people by his own authority, and without such consent of the people, he thereby invades the fundamental law of property, and subverts the end of government. For what property have I in that, which another may by right take when he pleases to himself?"

Dr. Adam Smith, the ingenious author of "An Enquiry into the Nature and Causes of the Wealth of Nations," to whose work we have had occasion to refer, lays down (vol. ii. p. 2.) the four following maxims with regard to taxes in general. "1. The subjects of every state ought to contribute towards the support of the government, as nearly as possible, in proportion to their respective abilities, that is, in proportion to the revenue which they respectively enjoy under the protection of the state. 2. The tax, which each individual is bound to pay, ought to be certain, and not arbitrary. The time of payment, the manner of payment, the quantity to be paid, ought all to be clear and plain to the contributor, and to every other person. When it is otherwise, every person subject to the tax is put more or less in the power of the tax-gatherer, who can either aggravate the tax upon any obnoxious contributor, or extort, by the licence of such aggravation, some present or perquisite to himself. 3. Every tax ought to be levied at the time, or in the manner, in which it is most likely to be convenient for the contributor to pay it. 4. Every tax ought to be so contrived, as both to take out and to keep out of the pockets

## TAX.

pockets of the people as little as possible, over and above what it brings into the public treasury of the state." This maxim may be counteracted by requiring for the levying of the tax a great number of officers, whose salaries may consume the greater part of the produce of the tax, and whose perquisites may impose another tax upon the people;—by obstructing their industry, and discouraging them from applying to certain branches of business, which might give maintenance and employment to great multitudes;—by the forfeitures and other penalties which those unfortunate individuals incur, who attempt unsuccessfully to evade the tax, which may ruin them, and thus put an end to the benefit the community might have received from the employment of their capitals; the penalties of smuggling being so ordered as to rise in proportion to the temptation; and by subjecting the people to the frequent visits and the odious examination of the tax-gatherers, which occasion much trouble, vexation, and oppression.

As the private revenue of individuals arises ultimately from the three different sources of rent, profit, and wages, every tax must finally be paid from one or other of these three different sorts of revenue, or from all of them indifferently. The first kind of taxes comprehends those upon the rent of land. (See *LAND-TAX*.) Taxes upon the produce of the land are in reality taxes upon the rent. (See *TITHES*.) Taxes upon the rent of houses include that which may be called the Building rent, and that which is commonly called the Ground rent; and so far as these fall upon the inhabitants, they must be drawn from the same source as the rent itself, and must be paid from their revenue, whether derived from the wages of labour, the profits of stock, or the rent of land; and it is in every respect of the same nature as a tax upon any other sort of consumable commodities. Houses not inhabited ought to pay no tax; houses inhabited by the proprietor ought to be rated, not according to the expence which they might have cost in building, but according to the rent which an equitable arbitration might judge them likely to bring, if leased to a tenant. Ground rents are still a more proper subject of taxation than the rent of houses, or even the rent of land. The principal objection to all taxes upon houses and windows is their inequality, and therefore they are directly contrary to the first of Dr. Smith's maxims above stated. Their natural tendency is to lower rents.

Taxes upon profit, or upon the revenue arising from stock, comprehend the tax upon stock, such as is imposed by the land-tax in England, by which it was intended that the stock should be taxed in the same proportion as the land, and taxes upon the profit of particular employments. Taxes upon the wages of labour must finally fall upon the consumer. Besides the taxes already enumerated, there are others, such as capitation taxes, and taxes upon consumable commodities, which must be paid indifferently from whatever revenue the contributors may possess; from the rent of their land, from the profits of their stock, or from the wages of their labour. The impossibility of taxing the people, in proportion to their revenue, by any capitation, seems to have given occasion to the invention of taxes upon consumable commodities; and these are either necessaries or luxuries. A tax upon the necessaries of life operates exactly in the same manner as a direct tax upon the wages of labour, and will fall, if the labourer be employed by a manufacturer, on the consumer; or if he be employed by a farmer, it will fall upon the rent of the landlord. But it is otherwise with respect to taxes upon luxuries. The rise in the price of the taxed commodities, will not necessarily occasion any rise in the wages of labour. Any rise in the average

price of necessaries, unless it is compensated by a proportionable rise in the wages of labour, must necessarily diminish more or less the ability of the poor to bring up numerous families, and consequently to supply the demand for useful labour; whatever may be the state of that demand, whether increasing, stationary, or declining; or such as requires an increasing, stationary, or declining population.

Taxes upon luxuries have no tendency to raise the price of any other commodities except that of the commodities taxed. Taxes upon necessaries, by raising the wages of labour, necessarily tend to raise the price of all manufactures, and consequently to diminish the extent of their sale and consumption. Taxes upon luxuries are finally paid by the consumers of the commodities taxed, without any retribution. They fall indifferently upon every species of revenue, the wages of labour, the profits of stock, and the rent of land. Taxes upon necessaries, so far as they affect the labouring poor, are finally paid, partly by landlords in the diminished rent of their lands, and partly by rich consumers, whether landlords or others, in the advanced price of manufactured goods; and always with a considerable over-charge.

In Great Britain, the principal taxes upon the necessaries of life are those upon salt, leather, soap, and candles. Heavy taxes upon these commodities must somewhat increase the expence of the sober and industrious poor, and must, consequently, more or less raise the wages of their labour. Such taxes, notwithstanding their immediate effect, afford a considerable revenue to government, and accordingly they are continued and multiplied.

Consumable commodities, whether necessaries or luxuries, may be taxed in two different ways. The consumer may either pay an annual sum on account of his using or consuming goods of a certain kind; or the goods may be taxed while they remain in the hands of the dealer, and before they are delivered to the consumer. The consumable goods which last a considerable time before they are consumed altogether, are most properly taxed in the one way. Those of which the consumption is either immediate or more speedy, in the other.

Of the latter kind is the greater part of the duties of excise and customs. Those of excise are imposed chiefly upon goods of home produce destined for home consumption; and they are imposed only upon a few sorts of goods of the most general use. The duties of customs are much more ancient than those of excise. (See *CUSTOMS* and *EXCISE*.) It is observed that high taxes, sometimes by diminishing the consumption of the taxed commodities, and sometimes by encouraging smuggling, frequently afford a smaller revenue to government than what might be drawn from more moderate taxes.

When the diminution of revenue is the effect of the diminution of consumption, there can be but one remedy, and that is the lowering of the tax.

When the diminution of the revenue is the effect of the encouragement given to smuggling, it may perhaps be remedied in two ways; either by diminishing the temptation to smuggle, or by increasing the difficulty of smuggling. The temptation to smuggle can be diminished only by the lowering of the tax; and the difficulty of smuggling can be increased only by establishing that system of administration which is most proper for preventing it.

The duties upon foreign luxuries imported for home consumption, though they sometimes fall upon the poor, fall principally upon people of middling or more than middling fortune. Such are, for example, the duties upon foreign wines, upon coffee, chocolate, tea, sugar, &c.

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The duties upon the cheaper luxuries of home produce destined for home consumption, fall pretty equally upon people of all ranks in proportion to their respective expence. The poor pay the duties upon malt, hops, beer, and ale, upon their own consumption: the rich, upon both their own consumption and that of their servants.

The whole consumption of the inferior ranks of people, or of those below the middling rank, it must be observed, is in every country much greater, not only in quantity, but in value, than that of the middling and of those above the middling rank. The whole expence of the inferior is much greater than that of the superior ranks. Although the expence of people of inferior ranks, taking them individually, is very small, yet the whole mass of it, taking them collectively, amounts always to by much the largest portion of the whole expence of the society; what remains, of the annual produce of the land and labour of the country for the consumption of the superior ranks, being always much less, not only in quantity but in value. The taxes upon expence, therefore, which fall chiefly upon that of the superior ranks of people, upon the smaller portion of the annual produce, are likely to be much less productive than either those which fall indifferently upon the expence of all ranks, or even those which fall chiefly upon that of the inferior ranks; than either those which fall indifferently upon the whole annual produce, or those which fall chiefly upon the larger portion of it.

The best taxes, says Mr. Hume, (vol. i. Ess. 8.) are such as are levied upon consumptions, especially those of luxury; because such taxes are least felt by the people. They seem, in some measure, voluntary: since a man may chuse how far he will use the commodity which is taxed. They are paid gradually and insensibly; they naturally produce sobriety and frugality, if judiciously imposed; and being compounded with the natural price of the commodity, they are scarcely perceived by the consumers. Their only disadvantage is, that they are expensive in levying. Taxes upon possessions are levied without expence; but they have every other disadvantage. Most states, however, are obliged to have recourse to them, in order to supply the deficiencies of the other. When a tax is laid upon commodities which are consumed by the common people, the necessary consequence may seem to be, either that the poor must retrench something from their way of living, or raise their wages, so as to make the burden of the tax fall upon the rich; but there is a third consequence, which often follows upon taxes, namely, that the poor increase their industry, perform more work, and live as well as before, without demanding more for their labour. Where taxes are moderate, are laid on gradually, and do not affect the necessaries of life, this consequence naturally follows; and it is certain, that such difficulties often serve to excite the industry of a people, and render them more opulent and laborious than others, who enjoy the greatest advantages. The most pernicious of all taxes are the arbitrary: they are commonly converted, by their management, into punishments on industry; and, also, by their unavoidable inequality, are more grievous than the real burden which they impose. Poll-taxes are commonly arbitrary. A duty upon commodities checks itself; and a prince will find, that an increase of the impost is no increase of his revenue.

After all the proper subjects of taxation have been exhausted, if the exigencies of the state still continue to require new taxes, they must be imposed upon improper ones. It has been well observed, "that oppressive taxation is a monster, which, after devouring every other thing, devours itself at last."

The taxes which are raised on the British subject are either annual or perpetual. The usual annual taxes are those upon land and malt.

The first of these is the land-tax, for an account of which see *LAND-TAX*.

See also *HIDAGE, SCUTAGE, TALLIAGE, TENTH, FIFTEENTH, and SUBSIDY*.

The other annual tax is the malt-tax, which is a sum raised every year by parliament ever since 1697. See *MALT*.

The perpetual taxes are the customs, which are a tax immediately paid by the merchant, although ultimately by the consumer (see *CUSTOMS*); the excise-duty, which is an inland imposition, paid sometimes upon the consumption of the commodity, or frequently upon the retail sale, which is the last stage before the consumption (see *EXCISE*); the duty upon *salt*: that for the carriage of letters or *post*; the *stamp-duties*; the duty upon houses and *windows*; the duty arising from licences to hackney-coaches and chairs in London, and the parts adjacent; and the duty upon offices and pensions. See *LAND-TAX, &c. &c.*

The assessed taxes comprehend those on windows, houses, servants, carriages, horses and mules, dogs, horse-dealers, hair-powder, armorial bearings, and game licences. For those on windows, see the following schedule.

### Schedule (A.) 48 G. III. c. 55.

Number of windows according to which the duties shall be charged.	Duties. £ s. d.
Not more than 6 windows or lights (except in such houses which shall be worth the rent of 5 <i>l.</i> by the year, and shall be charged to the duty mentioned in Schedule (B.), according to the rent thereof)	0 6 6
Not more than 6 windows or lights, if of the value before-mentioned, and charged to the said duty accordingly	0 8 0
7 windows or lights	1 0 0
8 - - do.	1 13 0
9 - - do.	2 2 0
10 - - do.	2 16 0
11 - - do.	3 12 6
12 - - do.	4 9 6
13 - - do.	5 6 6
14 - - do.	6 3 6
15 - - do.	7 0 0
16 - - do.	7 17 0
17 - - do.	8 14 0
18 - - do.	9 10 6
19 - - do.	10 7 6
20 - - do.	11 4 6
21 - - do.	12 1 0
22 - - do.	12 18 0
23 - - do.	13 15 0
24 - - do.	14 11 6
25 - - do.	15 8 6
26 - - do.	16 5 6
27 - - do.	17 2 0
28 - - do.	17 19 0
29 - - do.	18 16 0
30 - - do.	19 12 6
31 - - do.	20 9 6
32 - - do.	21 6 6
33 - - do.	22 3 0
34 - - do.	23 0 0
35 - - do.	23 16 6
36 - - do.	24 13 6

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Not more than	£	s.	d.
37 windows or lights	25	10	6
38 - - do.	26	7	0
39 - - do.	27	4	0
40 to 44 do.	28	17	6
45 - 49 do.	31	13	6
50 - 54 do.	34	10	0
55 - 59 do.	37	6	0
60 - 64 do.	39	15	6
65 - 69 do.	42	0	6
70 - 74 do.	44	5	0
75 - 79 do.	46	10	0
80 - 84 do.	48	15	0
85 - 89 do.	51	0	0
90 - 94 do.	53	4	6
95 - 99 do.	55	9	6
100 - 109 do.	58	17	0
110 - 119 do.	63	6	6
120 - 129 do.	67	16	6
130 - 139 do.	72	6	0
140 - 149 do.	76	16	0
150 - 159 do.	81	5	6
160 - 169 do.	85	15	6
170 - 179 do.	90	5	0
180 and upwards do.	93	2	6

And for every such dwelling-house which shall contain more than 180 windows or lights, for every window or light exceeding the number of 180 - - - - - 0 3 0  
See WINDOWS.

Schedule (B.) 48 Geo. III. c. 55. Duties on inhabited dwelling-houses.

For every such inhabited house with the household and other offices, yards, and gardens, therewith occupied and charged, as are or shall be worth the rent herein-after mentioned by the year, there shall be charged the yearly sums following; viz.

5l. and under 20l. rent, by the year	-	-	0	1	6
20l. and under 40l. rent, by the year	-	-	0	2	3
40l. rent by the year, and upwards	-	-	0	2	10

The duties payable by 48 Geo. III. c. 55. annually for male servants are as below.

Schedule (C.) N° 1.

	Number of Servants.	Amount of Duty for each Servant.
		£ s. d.
For 1 such servant	-	2 4 0
2 - do.	-	2 16 0
3 - do.	-	3 7 0
4 - do.	-	3 18 0
5 - do.	-	4 9 0
6 - do.	-	4 14 0
7 - do.	-	4 16 0
8 - do.	-	5 3 0
9 - do.	-	5 12 0
10 - do.	-	6 3 0
11 - do. and upwards	-	7 1 0

For every such servant retained or employed by any male persons, never having been married, over and above the before-mentioned duties, the further sum of - - - - - 1 14 0

Schedule (C.) N° 2. Duties payable annually for male servants retained or employed in the several capacities herein mentioned.

For every gardener or person employed to work in any garden under any person chargeable to the duties mentioned in Schedule (C.), N° 1; and for every gardener employed in any garden wherein the constant labour of one person shall not be necessary, the sum of - 0 6 0

To be paid by each person in whose garden such person shall be employed.

Exemptions from the Duties as set forth in Schedule (C.) N° 1. and 2.

Any person employed by the day or week to work as a day labourer, at the usual rate of wages for day labourers in agriculture, in any garden belonging to a dwelling-house, being a farm-house, and exempted as such from the duties mentioned in Schedule (B.), or in any garden belonging to a dwelling-house not chargeable to the duties mentioned in the said schedule, such garden not requiring the constant labour of one such labourer.

Schedule (C.) N° 3. Duties payable annually for every male person or servant retained or employed in the several capacities herein mentioned.

For every male person employed by any merchant or trader as a traveller or rider, the duties following; viz.

Where one such traveller or rider and no more shall be so employed, the sum of - - - 2 8 0

And where more than one such traveller or rider shall be so employed, for each the sum of - 3 10 0

For every male person employed by any person in trade, or exercising any profession whatever, as a clerk or book-keeper, or office-keeper, except apprentices, where no premium, or a premium less in value than the sum of 20l. has been paid or contracted for with such apprentice, the duties following; viz.

Where one such clerk, book-keeper, or office-keeper, and no more shall be so employed, the sum of - - - - - 1 4 0

And where more than one such clerk, book-keeper, or office-keeper shall be so employed, for each the sum of - - - - - 2 8 0

For every male person employed by any person in trade as a shopman, for the purpose of exposing to sale or selling goods, wares, or merchandise, in such shop or warehouse, whether by wholesale or retail; and every male person employed as a warehouseman, porter, or cellarman, in such shop or warehouse, except apprentices as aforesaid, the sum of - - - 1 4 0

The said duties to be paid by the employer or employers of such persons, and to extend to every body politic or corporate, whether aggregate or sole, and to every society, fraternity, or partnership, although not corporate; and to every manufacture or concern (except husbandry) whereby the employer shall seek a profit.

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For every male servant employed as a waiter (except occasional waiters, over and above the ordinary number usually kept) in any taverns, coffee-houses, inns, ale-houses, or other licensed houses, or in eating or victualling houses, or in hotels or lodging-houses, being eating or victualling houses, the sum of -

£ s. d. Schedule (D.) N<sup>o</sup> 1. Duties payable on all carriages of any of the descriptions mentioned herein.

		Number of Carriages.		Amount of Duty for each Carriage.	
				£	s. d.
2	5	0	For 1 such carriage, the annual sum of	-	11 5 0
			2 - do.	-	12 7 0
			3 - do.	-	13 10 0
			4 - do.	-	14 0 0
			5 - do.	-	14 12 0
			6 - do.	-	15 3 0
			7 - do.	-	15 14 0
			8 - do.	-	16 5 0
			9 - do. and upwards	-	16 16 0
			1	4	0

For every male servant retained by any stable-keeper to take care of any horse, mare, or gelding, of any other person or persons, kept for the purpose of racing or running for any plate, prize, sum of money, or other thing, or any horse, mare, or gelding, in training for any of the said purposes, whereby such stable-keeper shall gain a livelihood or profit, the sum of - - - - -

For every male servant *bonâ fide* retained for the purposes of husbandry, manufacture, or trade, by which the master or mistress shall gain a livelihood or profit, and at any time employed in any domestic employment in any of the capacities in Schedule (C.), N<sup>o</sup> 1, and not chargeable to the duties in the said schedule, the sum of - - - - -

Schedule (D.) N<sup>o</sup> 2.

For carriages with less than four wheels:

For every such carriage (except taxed carts, constructed, kept, and used, under the regulations of this act) drawn by one horse, mare, or gelding, and no more - - - - - 5 18 0

And for every such carriage, drawn by two or more horses, mares, or geldings - - - - - 8 5 0

And for every additional body of the description herein-after mentioned, successively used on the same carriage or number of wheels, the further sum of - - - - - 2 16 0

For every male servant *bonâ fide* retained for the purposes of husbandry, or any manufacture or trade, by which the master or mistress shall gain a livelihood or profit, and at any time employed in the capacity of a groom, stable-boy, or helper in the stables, where the master or mistress shall be chargeable for one horse, and no more, to the duty on horses kept for the purposes of riding, or drawing a taxed cart, or to the duty on such taxed cart, and not on any other carriage chargeable with duty by this act, the sum of - - - - -

The said last-mentioned duties to be paid by the employer, or master or mistress of such persons or servants.

Schedule (C.) N<sup>o</sup> 4. Duties payable on servants let to hire.

For every coachman, groom, postilion, or helper, kept for the purpose of being let to hire for any period of time less than one year, and in such manner that the stamp-office duty payable by law on horses let to hire shall not be payable on every such letting by any post-master, inn-keeper, or other person, duly licensed to let post-horses by the commissioners for managing the duties on stamped vellum, parchment, and paper, or by any coach-maker or maker of such carriages, or other person, the annual sum of - - - - -

Schedule (D.) N<sup>o</sup> 3.

For carriages hired for any period of time less than one year, or kept to be let to hire, or to carry passengers:

For every such carriage kept for the purpose of being let to hire, with horses to be used therewith, for any period of time not exceeding twenty-eight days, so that the stamp-office duty, payable by law on horses let to hire shall be duly paid and satisfied on every such letting by any post-master, inn-keeper, or other person duly licensed to let post-horses, by the commissioners for managing the duties on stamped vellum, parchment, and paper, and whereon the name or names and place of abode of the person or persons so licensed shall be marked or painted, according to the directions of the act in that case made and provided; if such carriage shall have four wheels, the sum of - - - - - 9 9 0

And if such carriage shall have less than four wheels, the respective sums mentioned in Schedule (D.) N<sup>o</sup> 2, according to the number of horses used therewith, as therein mentioned.

The said duty to be paid by the person or persons letting the same to hire.

These several duties are subject to certain exemptions. The provisions of 43 Geo. III. c. 161. relating to the assessments of servants, are as follow. Persons liable to these duties are to return lists of their servants, and are chargeable accordingly from the year commencing from the days stated in their returns; and they are subject to the powers of surcharge. Persons beginning or ceasing to keep servants are to give notice in writing to the assessor of the district in which they reside.

And for every coach, diligence, caravan, or chaise with four wheels or more, or other carriage with four wheels or more, by whatever name the same shall be called or known, which shall be kept and employed as a public stage-coach or carriage for the purpose of conveying passengers for hire to and from different places, and which shall be duly entered as such with the said commissioners of stamp duties, the like sum of - - - - - 9 9 0

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All which last-mentioned duties shall respectively be paid by the person or persons keeping the same, for the purposes aforesaid.

£ s. d.

For every carriage kept for the purpose of being let to hire for any period of time less than one year, and in such manner that the said stamp-office duty shall not by law be payable on such letting by any person so licensed as aforesaid, or by any coach-maker or maker of such carriages, or other person, if such carriage shall have four wheels, the annual sum of - - - - - 11 5 0

The said last-mentioned duty to be paid by the person or persons keeping the same for the purposes aforesaid.

Provided, if a due return thereof shall not be made by the hirer or hirers according to the directions of the acts herein mentioned, the progressive duty, as set forth in Schedule (D.) N<sup>o</sup> 1, shall be chargeable in respect of every such carriage on the person or persons hiring the same, and making such default as aforesaid, subject to the provisions contained in the said acts concerning the same.

And if such carriage shall have less than four wheels, the respective sums mentioned in Schedule (D.) N<sup>o</sup> 2, according to the number of horses to be used therewith, to be paid by the person or persons keeping the same for the purpose aforesaid, subject to the provisions herein-after contained concerning the same. See COACH and Taxed CART.

By 50 Geo. III. c. 104. certain new duties are imposed.

A Schedule of the Duties payable on Carriages called Taxed Carts.

### N<sup>o</sup> I.

For every carriage called a taxed cart, built and constructed according to the regulations of the said act, in every respect the original price of which shall not have exceeded, or the value whereof shall not at any time exceed the sum of 15*l.* sterling, and which shall not at any time be used with a covered or stuffed seat, or with a covered foot-board or apron thereto fixed or not fixed, there shall be charged the annual sum of - - - - - 1 6 6

### N<sup>o</sup> II.

For every such carriage called a taxed cart, built and constructed with a spring or springs of any materials whatever, (except of iron, steel, or any other metallic substance, or any composition of iron, steel, or other metallic substance, either wholly or in part,) the original price of which carriage shall not have exceeded, or the value whereof shall not at any time exceed the sum of 20*l.* sterling, or which shall be used with a stuffed seat or cushion, or with a covered foot-board or apron thereto fixed or not fixed, there shall be charged the annual sum of - - - - - 2 10 0

A Schedule of the Duties payable on Carriages with less than Four Wheels.

### N<sup>o</sup> III.

For every carriage with less than four wheels chargeable by the said act of the forty-eighth

of his present majesty's reign with the duty of 5*l.* 18*s.* if drawn by one horse, mare, or gelding, and no more, there shall be charged the like amount of duty for every such carriage drawn by one horse, mare, gelding or mule, and no more, viz. the annual sum of - - - 5 18 0

For every such carriage chargeable by the said act with the duty of 8*l.* 5*s.* if drawn by two or more horses, mares, or geldings, there shall be charged the like amount of duty for every such carriage drawn by more than one horse, mare, gelding or mule, viz. the annual sum of 8 5 0

And for any additional body successively used on the same carriage or number of wheels chargeable by the said act with the further duty of 2*l.* 16*s.* there shall be charged the like amount of further duty, for every additional body successively used on the same carriage or number of wheels, if drawn in the manner herein mentioned, viz. the further annual sum of - 2 16 0

Schedule (E.) N<sup>o</sup> 1. Duties payable for all horses, mares and geldings, kept and used for the purpose of riding, or of drawing any carriage chargeable with duty by Schedule (D.)

	Number thereof.	Amount of duty for each Horse, Mare, or Gelding.
		£ s. d.
For 1 such horse, mare, or gelding	-	2 13 6
2 such horses, mares, or geldings	-	4 9 6
3 - do.	-	4 18 6
4 - do.	-	5 2 0
5 - do.	-	5 3 0
6 - do.	-	5 7 6
7 - do.	-	5 10 0
8 - do.	-	5 10 0
9 - do.	-	5 12 0
10 - do.	-	5 17 6
11 - do.	-	5 17 6
12 - do.	-	5 17 6
13 - do.	-	5 18 0
14 - do.	-	5 18 0
15 - do.	-	5 18 0
16 - do.	-	5 18 0
17 - do.	-	5 18 6
18 - do.	-	5 19 6
19 - do.	-	6 0 0
20 and upwards	-	6 1 0

*Rules.*—The said duties to be payable annually for every horse, mare, or gelding, used on any occasion for the purpose of riding, or of drawing any carriage for which any duty is payable by this act, or hired by the year, or any longer period, and to be paid by the person or persons using the same. These duties are subject to certain exemptions in favour of husbandry, under certain circumstances.

Schedule (E.) N<sup>o</sup> 2. Duties payable on horses let to hire.

For every horse, mare, or gelding, let to hire for the purpose of riding, or of drawing any such carriage as aforesaid, for any period of time less than one year, in any manner so that the stamp-office duty payable by law on horses let to hire shall not be payable, the sum of - 2 13 6

To be charged annually on the person or persons letting the same; provided, if a due return thereof shall not be made by the hirer or hirers, according to this act, the progressive duty, as set forth in Schedule (E.) N<sup>o</sup> 1, shall be chargeable in respect of every such horse, mare, or gelding, on the person or persons hiring the same, and making such default as aforesaid, subject to the provisions of this act.

Schedule (E.) N<sup>o</sup> 3. Duties payable on horses kept for the purpose of racing or running for any plate, prize, or sum of money, or other thing, or kept in training for any of the said purposes.

For every horse, mare, or gelding, *bonâ fide* kept for the purpose of racing or running for any plate, prize, or sum of money, or other thing, or kept in training for any of the said purposes, whether in the stables of the proprietor or proprietors, or of any other person or persons, the sum of - - - - - £ s. d.

The said duty to be charged annually on the person or persons having the custody, charge, or management of such horses, mares, or geldings.

Schedule (F.) N<sup>o</sup> 1. Duties payable for all horses, mares, and geldings, not charged with any duty according to the Schedule (E.) N<sup>o</sup> 1, 2, 3, and also on mules.

For every horse, &c. not chargeable with any duty according to the Schedule (E.) N<sup>o</sup> 1, 2, and 3, as aforesaid, and for every mule, except in the cases herein-after mentioned, where-in other duties are made payable, the sum of - - - - - £ s. d.

Schedule (F.) N<sup>o</sup> 2. Duties payable on husbandry-horses, in the cases herein-after mentioned.

Any person occupying a farm at rack-rent, the rent of which shall be less than 20*l.* a-year, and making a livelihood solely thereby, or occupying any estate on any other tenure than as tenant at rack-rent solely, or such other estate, together with the farm at rack-rent, the value of which in the whole shall be less than equivalent to a farm at the rack-rent of 20*l.* a-year (reckoning the value of every estate occupied by the owner thereof, or on any tenure other than as tenant at rack-rent, as equivalent to double the amount of the like farm at rack-rent), and making a livelihood solely by such his own estate, or by such estate and farm jointly, or principally thereby, and likewise a profit by any trade or employment, and keeping not more than two horses, mares, geldings, or mules, *bonâ fide* for the purpose of such occupation, shall be charged for each of such two horses, mares, geldings, or mules, the sum of - - - - - £ s. d.

Any person occupying a farm at rack-rent in Wales or Scotland, the rent of which shall be less than 10*l.* sterling a-year, and making a livelihood principally thereby, or occupying any estate on any other tenure than as tenant at rack-rent, or such other estate, together

with a farm at rack-rent, the value of which in the whole shall be less than equivalent to a farm at the rack-rent of 10*l.* sterling a-year (reckoning the value of every estate occupied by the owner thereof, or on any tenure other than as tenant at rack-rent, as equivalent to double the amount of the like farm, at rack-rent), and making a livelihood principally thereby, and likewise a profit by any trade or employment, and keeping not more than two horses, mares, geldings, or mules, *bonâ fide* for the purposes of such occupation, and of such trade or employment jointly, or either of them separately, shall be charged for each of such two horses, mares, geldings, or mules, the sum of - - - - - £ s. d.

Rules for charging the duties, as set forth in Schedule (F.) N<sup>o</sup> 1 and 2.

The said duties to be charged annually, and paid by the person or persons keeping or using such horses, mares, geldings, or mules, and to be payable for every horse, mare or gelding, and mule, which shall not be chargeable nor have been charged with any duty payable in that year, according to the preceding schedule marked (E.) by virtue of the rules or exemptions therein contained, except as herein-after is mentioned.

Exemptions from the duties in Schedule (E.) N<sup>o</sup> 1 and 2.

Any person whatever, for any horse, mare, or gelding, not being by due admeasurement of the height of thirteen hands, of four inches to each hand, or which shall not at any time whatever have been used for any purpose of labour or otherwise. See HORSE and HORSE-Dealer.

Schedule (G.) N<sup>o</sup> 1. Duties payable on dogs.

For every greyhound, hound, pointer, setting-dog, spaniel, lurcher, or terrier, the annual sum of - - - - - £ s. d.

For every dog, of whatever description or denomination the same may be, where any person shall keep two or more dogs, either for his or her own use, or the use of any other person or persons, the annual sum of - - - - - £ s. d.

For every dog not being a greyhound, hound, pointer, setting-dog, spaniel, lurcher, or terrier, kept by any person having one such dog, and no more, whether the same be kept for his or her own use, or the use of any other person or persons, the annual sum of - - - - - £ s. d.

The said duties to be paid by the persons respectively keeping such dogs.

Exemptions from the duties in Schedule (G.)

Case 1.—Any dog belonging to his majesty, or any of the royal family.

Case 2.—Any person who, on account of poverty, shall be discharged from the assessment made in respect of his or her dwelling-house, in pursuance of the regulations of any of the acts herein-mentioned, and having one dog, and no more, the same not being a greyhound, hound, pointer, setting-dog, spaniel, lurcher, or terrier.

Case 3.—Any person, in respect of a dog or whelp, which at the time of returning the lists of dogs as by this act is required, shall not actually be of the age of six calendar months.

# TAX.

*Case 4.*—Any person in respect of the whole number of hounds by him or her kept in Great Britain, who shall compound for the same, in any year within thirty days after the 5th day of April in such year, in pursuance of notice given to the collector or collectors of the said duty for any parish or place, where such person shall be liable to be assessed, of his or her intention so to do, and on payment of the full sum of 3*l.* sterling to such collector or collectors, for which a receipt shall be given within the period before-mentioned.

## Schedule (H.) Duties payable by horse-dealers.

	£	s.	d.
Every person who shall use or exercise the trade and business of a horse-dealer within the cities of London and Westminster, and the liberties of the same respectively, the parishes of St. Mary-le-Bone and St. Pancras, in the county of Middlesex, the weekly bills of mortality, or the borough of Southwark, in the county of Surrey, the annual duty of - - -	22	10	0
Every person who shall use or exercise the trade and business of a horse-dealer in any other part of Great Britain, the annual duty of - - -	11	5	0

## Schedule (I.) Duties payable by persons in respect of hair-powder used or worn by them.

	£	s.	d.
By every person who shall have used or worn any hair-powder within the period limited by any of the acts herein mentioned, the annual sum of - - - - -	1	3	0

## Schedule (K.) Duties payable by persons in respect of any armorial bearing or ensign, used or worn by them, by whatever name the same shall be called; viz.

	£	s.	d.
By every such person chargeable with any duty made payable by this act, for any coach or other carriage, the annual sum of - - -	2	8	0
By every such person not chargeable for any such coach or other carriage, but who shall be chargeable to any of the duties on inhabited houses, or to the duties on houses, windows, or lights, made payable by this act, the annual sum of - - - - -	1	4	0
By every such person not chargeable for any such coach or other carriage, nor being chargeable to the said duties on inhabited houses, or to the duty on houses, windows, or lights, the annual sum of - - - - -	0	12	0

## Schedule (L.) Duties payable in respect of killing game.

	£	s.	d.
Upon every person who shall use any dog, gun, net, or other engine, for the purpose of taking or killing any game whatever, or any woodcock, snipe, quail or landrail, or any conies, in any part of Great Britain:	1	1	0
If such person shall be a servant to any person duly charged in respect of such servant to the duties granted on servants by this act, and shall use any dog, gun, net, or other engine, for any of the purposes before-mentioned, upon any manor or royalty in England, Wales, or Berwick-upon-Tweed, or upon any lands in Scotland, by virtue of any deputation or appointment, duly registered or entered as game-keeper thereto, there shall be charged the annual sum of - - - - -	1	1	0

And if such person as last aforesaid shall not be a servant, for whom the said duties on servants shall be charged, there shall be charged the annual sum of - - - - - 3 3 0

Upon every other person who shall use any dog, gun, net, or other engine for any of the purposes before-mentioned, there shall be charged the annual sum of - - - - - 3 3 0

By the 46 Geo. III. c. 84. every person having more than two children born in lawful wedlock, and *bonâ fide* maintained at the expence of such person, shall for every such child above two be allowed at the rate of 4 per cent. on the amount of all the assessments on such person by virtue of the 43 Geo. III. c. 161. 45 Geo. III. c. 13. 46 Geo. III. c. 78. in case the total amount of all the assessments shall be under 40*l.* in any one year, which allowance shall be made annually out of the duties so charged, at any time in the year of assessment, on delivery of a declaration in writing, containing the whole number of such children, and their respective names and places of residence, and which of them are of the family, or reside elsewhere.

By s. 2. this provision shall extend to children by a former marriage, either of the husband or wife.

The statute 43 Geo. III. c. 99. reciting that it is expedient that certain of the provisions contained in any acts relating to the duties on windows or lights, on inhabited houses, servants, carriages, horses, mules, and dogs, and other duties lately transferred to the commissioners for the affairs of taxes, should be consolidated and amended: enacts that all the said duties under the management of such commissioners (except the land-tax) shall, from and after April 5, 1804, be assessed, raised, levied, and paid under the regulations thereof.

And as new duties may hereafter be placed under their management, to be assessed in like manner, it is declared that this act shall, with respect to such duties, take effect after the time fixed by the act or acts granting them for the commencement of the same. See the provisions of this act detailed in Burn's Justice, *ubi supra*.

The property-tax being now extinct, we are happily relieved from giving any account of it.

For the qualifications and powers of commissioners, the appointment of assessors and collectors, the mode of making assessments, surcharges, appeals, &c. &c. we refer to Burn's Justice, art. *Taxes*.

For the duty on post-horses, &c. see *POST-HORSE*.

The revenue arising from the several taxes, which is annually paid to the creditors of the public, or carried to the sinking fund, is first deposited in the royal exchequer, and thence issued out to the respective offices of payment: for the manner in which it is applied, see *FUND* and *NATIONAL DEBT*. See also *REVENUE*.

The people of France were strangers to *tailles* or taxes till the time of St. Louis, when they were first imposed in form of subsidies necessary for the support of the war in the Holy Land. See *CROISADE*.

They were then extraordinary levies, and were raised by capitation; but they were afterwards made perpetual under Charles VII. and Philip the Fair, who, to raise money without disturbing the people, called the people, as a third estate, into the general councils of the realm.

TAX also denotes the tribute which tenants were occasionally to pay their lord.

Most lords had a right of taxing on four occasions: *viz.* when the lord was taken prisoner in a just war; when he made

made his eldest son a knight; when he married his eldest daughter to a gentleman; and when he made the voyage of the Holy Land.

Naudé shews the extravagant rise of this kind of taxes: those, he observes, which under Charles VI. only amounted to the sum of 40,000 livres, were increased under Charles VII. to the sum of 1,800,000; under Louis XI. to 4,740,000; under Charles VIII. to 6,000,000; and under Louis XII. to 7,640,000 livres.

Taxes were distinguished into *free*, which were those due, in the four cases, by freemen, or those who held free lands; and *servile* and *base*, which were those due from persons of base condition.

They were also distinguished into *real* and *personal*. The personal were imposed on the head of the servant or man in mainmort, and so followed him wherever he went.

TAXA, in *Geography*, one of the small Western islands, near the south-east coast of Italy. N. lat. 55° 43'. W. long. 6° 3'.

TAXAMALCA, a town of Mexico; 60 miles S. of Mexico.

TAXAMARCA, a town of Mexico, in the province of Mechoacan; 40 miles E. of Mechoacan.

TAXANTHEMA, in *Botany*, so named by Necker, from *ταξις*, a row, and *ανθημα*, inflorescence, because some of the plants on which this supposed genus is founded differ from other species of *Statice*, in having their flowers disposed in a regular series, or row, and not in a round head; witness *S. Limonium* and its allies. These species indeed constitute Tournefort's genus of *Limonium*, but he associates with them others with dispersed flowers. (See *STATICE* and *LIMONIUM*.) Mr. Brown, Prodr. Nov. Holl. v. 1. 426, adopts Necker's genus and name, citing Tournefort's *Limonium* as a synonym. The latter name was probably judged too near *Limonia* to be retained. We presume to think the genus of *Statice* is in itself so natural, and so well distinguished from every other, that if a practical example were desired, to warn us against founding generic distinctions upon inflorescence alone, no better could be selected. See *CYME* and *GENUS*.

TAXERS, two officers yearly chosen in Cambridge, to see the true gauge of all weights and measures observed.

The name took beginning from taxing and rating the rents of houses, which was anciently the duty of their office.

TAX-GUTIUM, in *Ancient Geography*, a town of Rhætia, towards the source of the Rhine, near Brigantium. Ptol.

TAXIANA, an island situated in the Persian gulf, on the coast of Susiana, west of the isle of Tabiana. Ptol.

TAXILA, a large town of India, on this side of the Ganges. Ptol. and Strabo.

TAXIMIRA, a town of Phœnicia. Strabo.

TAXIPA, in *Geography*, a town of Mexico, in the province of Guafleca; 30 miles N.N.W. of Panuco.

TAXIS, *ταξις*, in the *Ancient Architecture*, signifies the fame with ordonnance in the new, and is described by Vitruvius to be that which gives every part of a building its just dimensions with regard to its use.

TAXIS, from *ταξωτα*, to put in order, in *Surgery*, the operation of reducing a hernia with the hand. See a particular account of it in the article *HERNIA*.

TAXITLAN, in *Geography*, a town of Mexico, in the province of Guafleca; 38 miles S. of St. Yago de los Valles.

TAXUS, in *Botany*, the ancient Latin name of the Yew-tree, used by Pliny. The word is supposed by some to be derived from *ταξω*, a bow, arrow, or dart, because

missile weapons were poisoned with its berries. We are confident that this precise explanation is erroneous, because, whatever may be the noxious qualities of any other part of the plant, the berries are simply mucilaginous and saccharine, eatable with impunity, as we have often experienced. The ancient use of this wood for bows, perhaps also for arrows or darts, might more truly account for the above etymology, did not Dioscorides expressly tell us *ταξω*; was Latin.—Linn. Gen. 532. Schreb. 706. Willd. Sp. Pl. v. 4. 856. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 1086. Prodr. Fl. Græc. Sibth. v. 2. 265. Ait. Hort. Kew. v. 5. 415. Pursh 647. Juss. 412. Lamarck Illustr. t. 829. Gærtn. t. 91.—Class and order, *Diœcia Monadelphica*. Nat. Ord. *Conifera*, Linn. Juss.

Gen. Ch. Male, *Cal.* none, except the scales of the bud, resembling a perianth of four leaves. *Cor.* none. *Stam.* Filaments numerous, united below into a column, longer than the bud; anthers depressed, blunt, with eight notches, at the edge, splitting all round at the base, and after shedding their pollen becoming flat and peltate, remarkable for their eight marginal segments.

Female, *Cal.* inferior, of one leaf, close, undivided, entire. *Cor.* none. *Pist.* Germen superior, ovate, acute; style none; stigma obtuse. *Peric.* none, except a spurious incomplete berry, formed of the calyx elongated into a globose juicy coloured sheath, open at the top, at length thrivelling and drying away. *Seed* one, ovate-oblong, projecting with its summit beyond the berry.

Ess. Ch. Male, Calyx none. Corolla none. Stamens numerous. Anthers peltate, with eight segments.

Female, Calyx cup-shaped, entire. Style none. Seed one, partly enveloped in the pulpy calyx.

Obs. Linnæus properly mentions that the berry of this genus cannot, strictly speaking, be denominated a pericarp. "It is a remarkable species of berry, like which nothing else is to be seen, except perhaps in *Gaultheria*." If the analogy here cited be just, the part in question is a real calyx, not more extraordinary in its change than that of *Blitum*, or of *Morus*, and we have always ventured to term it such, trusting to the analogies of *Juniperus* and *Ephedra* for our support.

1. *T. baccata*. Common Yew. Linn. Sp. Pl. 1472. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 746. (Taxus; Ger. Em. 1370. Matth. Valgr. v. 2. 444. Camer. Epit. 840.)—Leaves linear, two-ranked, crowded, nearly flat. Male flowers globose.—Native of mountainous woods, particularly in the clefts of high calcareous rocks, in various parts of Europe, from Norway to Greece, flowering in March or April. Dioscorides indeed, who calls this tree *σμυλαξ*, speaks of it as an exotic, the *ταξω*; of the Romans; but Mr. Hawkins noticed it wild on the rocks of mount Cyllene in Laconia. Thunberg says it is common in Japan. The trunk is straight, of slow growth, with a smooth deciduous bark, and very hard, tough, close-grained wood. Branches spreading horizontally in two directions. Leaves numerous, scattered, crowded, spreading in two rows, nearly sessile, linear, entire, slightly revolute, obtuse with a small point, smooth, of a dark shining green, permanent, about an inch long. Flowers axillary, solitary, nearly sessile, enveloped with imbricated bractæ; the male ones numerous, sometimes two or three together, cream-coloured, half the size of a pea, globose, abounding with pollen; females drooping, their green entire calyx just visible beyond the bractæ. This afterwards assumes the appearance of a bright scarlet berry, the size of a currant, open at the top, where the seed appears. The leaves are very poisonous, and if accidentally eaten by domestic cattle, prove fatal. The

ancients

ancients report that it is dangerous to sleep under this tree. It was formerly much planted in church-yards; and many Yews, perhaps "the tenants of a thousand years," still remain in the northern and Welsh village cemeteries. This was the favourite tree for clipping into any fantastic shape, on which art our old gardeners so much valued themselves; but the art and the material are now nearly alike discarded; and the garden is freed from one of the greatest asylums for vermin, the trim yew hedge.

2. *T. canadensis*. North American Yew. Willd. n. 2. Pursh n. 1. (*T. baccata*  $\beta$ , minor; Michaux Boreal.-Amer. v. 2. 245.)—Leaves linear, two-ranked, crowded, revolute. Male flowers globose, always solitary.—In shady rocky places in North America, flowering in March and April. In Canada. *Michaux*. Covering a great part of the rocky banks of the Antietum, in Maryland. Under the shade of other trees, it does not rise above two or three feet. *Pursh*. Michaux describes this species as of humbler growth than the former, spreading, and with smaller flowers and fruit. Willdenow says it is smaller and narrower in all its parts, nor does it alter by culture, and yet a specific distinction is hardly to be detected. The leaves, however, are narrower, smaller, and revolute at the margin. Male flowers always solitary in the bosoms of the leaves.

3. *T. elongata*. Long-leaved African Yew. Ait. ed. 1. v. 3. 415. ed. 2. n. 3. Willd. n. 3. Thunb. Prodr. 117.—Leaves scattered, linear-lanceolate. Branches somewhat whorled. Male flowers cylindrical, with spirally imbricated, very numerous, anthers.—Native of the Cape of Good Hope. Sent to Kew in 1774, and kept in several curious greenhouses in England as well as on the continent, flowering in July. Wild specimens, answering to Thunberg's character of the whorled branches, but without a name, are preserved in the Linnæan herbarium. In these the leaves are scattered, on short broad stalks, flat, coriaceous, somewhat glaucous, occasionally falcate, from one to two inches long. Male flowers axillary, solitary, cylindrical, obtuse, about half an inch in length, their scale-like anthers imbricated, exactly like those of a Fir. The garden plant has leaves half as long again, not glaucous, sometimes opposite on the young branches.

4. *T. montana*. Mountain Peruvian Yew. Willd. n. 4.—"Leaves two-ranked, linear, with a callous point; their upper edge rounded at the base; lower contracted."—Gathered by Humboldt and Bonpland on the mountains of Peru. Akin to *T. baccata*, but differing in the above character of the foliage. The same travellers noticed, in Mexico, what Willdenow judged to be a mere variety of this species, with leaves half as long again.

5. *T. nucifera*. Acorn-bearing Yew. Linn. Sp. Pl. 1472. Willd. n. 5. Ait. n. 3. Thunb. Jap. 275. Kämpf. Am. Exot. 814. t. 815.—Leaves two-ranked, distant, lanceolate, pointed, but half the length of the fruit.—Frequent, according to Kämpfer, in the northern provinces of Japan, flowering in spring, and ripening fruit late in autumn. Thunberg observed it here and there near Nagasaki, and in the island of Nipon. Mr. Aiton says it was cultivated in the greenhouse of Capt. Thomas Cornwall, in 1764. We have never examined this species. Kämpfer describes it as a lofty tree, with many opposite scaly branches; the wood light. Leaves hardly an inch long, one-third of an inch asunder, nearly sessile, tipped with a short point; dark shining green above; glaucous beneath. Female flowers axillary, solitary, dispersed, somewhat quadrangular, their thick fleshy scales becoming a sort of permanent cup at the base of the seed, or nut, which is coated, oval, pointed, above an inch long. The oil of the kernel is esteemed for

culinary purposes. The kernel itself is too astringent to be eaten in general.

6. *T. macrophylla*. Long-leaved Japan Yew. Thunb. Jap. 276. Willd. n. 6. Ait. n. 4. Banks Ic. Kämpf. t. 24. (*Sin*, vulgò Maki, seu *Fon Maki*, id est *Maki legitima*; Kämpf. Am. Exot. 780.)—Leaves scattered, lanceolate, pointless, spreading every way. Fruit stalked.—Common in Japan, flowering in June. Thunberg. Mr. William Kerr brought it from China to Kew in 1804. A greenhouse plant, flowering in July and August. Aiton. Kämpfer describes this as a large and stout tree, whose wood is valued for cabinet work, being not liable to the attacks of insects, or other causes of decay. The leaves are a finger's length, spreading equally in all directions; paler beneath. Male flowers cylindrical. Fruit axillary, stalked, with a pair of awl-shaped revolute scales at the top of the stalk. The seed is oval, the size of a pea, and seems by Kämpfer's figure to be elevated on a partial stalk above the fleshy calyx. Thunberg, however, speaks of the "ovate smooth green berry, turning black in drying, filled by an ovate white seed." Perhaps this may be a coated nut, as in *T. nucifera*.

7. *T. spinulosa*. Spinous-leaved Yew.—Leaves partly opposite or whorled, lanceolate, spinous-pointed, spreading every way. Fruit stalked.—For a specimen of this, said to have been brought by governor Philip from Port Jackson, New South Wales, we are indebted to A. B. Lambert, esq. It very much resembles Kämpfer's plate of the last, in general habit, but the leaves are hardly an inch and quarter long, and have each a spinous point. The stalks of the fruit are axillary, each crowned with a pair of lanceolate, revolute, permanent scales. Fruit oval, elevated on a stalk, which is equal in length to the calyx, composed of several fleshy scales, that envelopes it. The size and whole appearance of this fruit and its accompaniments are so precisely like Kämpfer's figure of the last, which indeed they help us to understand, that these two plants must be of the same genus, and are more truly perhaps akin to *T. nucifera*, than to *T. laccata*. On this subject we may expect information hereafter from Mr. Brown; if at least our present plant be really a native of New South Wales.

8. *T. latifolia*. Broad-leaved Cape Yew. Thunb. Prodr. 117. Willd. n. 7.—"Leaves solitary, lanceolate, pointed, smooth."—Found by Thunberg at the Cape of Good Hope.

9. *T. falcata*. Sickle-leaved Cape Yew. Thunb. Prodr. 117. Willd. n. 8.—"Leaves solitary, lanceolate, falcate, smooth."—From the same country. One of our wild specimens of *T. elongata* answers to this definition.

10. *T. tomentosa*. Downy Cape Yew. Thunb. Prodr. 117. Willd. n. 9.—"Leaves opposite, lanceolate, downy beneath."—Gathered at the Cape by Thunberg, whose specific characters of these species, except of the last, are not sufficient to distinguish them from the rest. We have seen no specimens.

11. *T. verticillata*. Whorled Japan Yew. Thunb. Jap. 276. Willd. n. 10. (*Ken sin*, item *Sen baku*, vulgò *Inu Maki*, id est *Maki spuria*; Kämpf. Am. Exot. 780.)—Leaves whorled, linear, falcate.—Native of Japan. A tree with dense branches, gradually shorter upward, so as to assume a conical figure, like a Cypress, three fathoms high. Fruit oblong, in two divisions; the lower part resembling nouffedung; the upper a grain of pepper, in which is loosely enclosed a fleshy, soft, sweetish kernel. Such is Kämpfer's description, by which it is easy to perceive the close resemblance of this fruit to our *T. macrophylla* and *spinulosa*. A specimen from Thunberg, without fructification, in the Linnæan herbarium, answers well to his own description,

tion, having round, smooth, greyish *branches*. Whorls from one to two inches asunder, each of about eight sessile, linear, falcate, entire, smooth, single-ribbed *leaves*, a finger's length, or more; two lines broad; obtuse, or slightly emarginate, at the end; of a dark shining green above; paler beneath.

TAXUS, in *Gardening*, furnishes a plant of the hardy evergreen kind, of which the species mostly cultivated is the common yew-tree (*T. baccata*.) This is a tree which has several varieties, as those with very short leaves, with broad shining leaves, and with striped or variegated leaves.

*Method of Culture*.—In this tree, the increase may be effected in several ways, as by seeds, and sometimes by layers and cuttings. In the first mode, after having procured a quantity of the yew berries, and divested them of the pulp or mucilage, they should be sown in beds of light earth, either in shallow drills, or scattered over the surface in the autumn or spring season; but the former is the best method, as the plants rise in the following spring; and be covered near an inch deep with light mould, out of the alleys, &c. They require no further care, only to keep the beds clean from weeds before and after the plants come up, and to give occasional waterings in dry weather, in spring and summer, to forward and strengthen the plants in their growth. They should have two years' growth in the seed-bed; then in the autumn or spring be planted out upon four-foot-wide beds, in nursery rows, a foot asunder, to remain two, three, or four years, when some may be planted out finally for hedges, where required; others in the nursery quarters, in rows, two or three feet asunder, to be trained in a suitable manner for the purposes they are intended.

And after growing in the nursery till they obtain from half a yard to four or five feet stature, they may be finally planted out in autumn or spring, for their intended purposes; when they will rise from the ground with a large spread of roots. They should be planted in their places as soon after removal as possible, giving each plant a good watering at the time.

In the future culture, those trained in hedges, &c. must be clipped or cut in annually, once or twice in the summer; and those in the shrubberies and rural plantations have the lower branches pruned up occasionally to a single stem; but the head should generally be permitted to spread agreeably to its natural mode of growth, except just reducing any considerable rambling branch, &c.

But the striped or variegated yews, and other varieties, should be increased by layers, slips or cuttings, as they are rarely permanent by seeds. The layers should be made from the young shoots of not more than a year or two old, being laid down in spring, summer, or early in autumn, when many of them will take root, and in one or two years be fit for planting off into nursery rows.

And the slips and cuttings should be made by cutting or slipping off a quantity of the one-year's shoots, divesting them of the lower leaves, and planting them in a shady border thick together, in small trenches, in the early spring or autumn, giving water at planting, and afterwards occasionally in dry hot weather. They will be well rooted in two years, and be fit for being planted out into wide nursery rows, or in any other similar manner.

All these plants may be employed as ornamental evergreens, and as forest-trees; and they were formerly much used in hedges and trained figures: they have a good effect in shrubberies among others of the evergreen tribe, being permitted to assume their natural growth, in common with other trees and shrubs; and also when planted as detached standards, in extensive distant opens of grass-ground, in

parks, and the sides of hills, &c.; likewise when introduced as forest-trees in timber plantations of the evergreen kind. See PLANTATION.

The different sorts of hedges and figure-works which were formerly in so high repute in gardens and pleasure-grounds, are now almost wholly in disuse, these being at present laid out in a more open and rural manner, so as to have a greater imitation of nature, and a more full display of their several quarters and parts, as the lawn, walks, and other places, together with the various plants belonging to them.

Single yews are now even hardly ever admitted in modern designs by way of ornament, but these trees, in their natural growths, are desirable for introducing into large plantations of the durative kind, for the sake of increasing the variety; and though some persons reject them in consequence of their poisonous nature, and gloomy mournful aspect, others admire them for such solemn appearances, and think they afford a remarkably fine contrast with the other more lively evergreens. There can be no doubt that the leaves, especially when withered, or dried a little, are of a poisonous quality; besides, the tree has had the title of the *deadly yew* given to it by some, and been looked upon as an emblem of mortality, and on that account planted in church-yards, to remind people of their latter end. That accidents have frequently arisen to cattle, of both the horse and cow kind, from eating the green leaves and tender shoots, but more particularly when in the above states, is certain. Therefore, as the cuttings or clippings of this sort are often liable to be eaten with greediness by some cattle, particularly cows, even when they have lain in the sun for a day or two, and are become half dried, it is proper and necessary that they should be either carefully destroyed by fire, or put quite out of the way of all sorts of animals, and not, as is too frequently the practice, be carelessly thrown over the walls or hedges, into the roads, lanes, or on the rubbish heaps, where cattle frequent.

The best sizes of yew plants are probably from two or three, to five or six feet in height; but those of seven or eight may be removed with balls of earth about their roots, and be used for particular purposes and occasions. Watering at the time of planting them is constantly requisite.

TAXUS, in *Zoology*, the *URSUS Males*, or common *Badger*; which see.—Also, a name given by Kæmpfer to the hyæna of the ancients. See *CANIS Hyæna*, and *HYÆNA*.

TAY, in *Geography*, is a river in Perthshire, Scotland, considered as the greatest of the Scottish rivers, has its source in the western extremity of the county, in the district of Breadalbane, on the frontiers of Lorn, in Argyleshire; but has not the appellation of Tay till it issues from the lake of that name. At its source it bears the name of Fillan; and descending in a circuitous course of eight or nine miles through a valley, to which it gives the name of Strathfillan, it falls into Loch Dochart. This lake, about three miles in length, has an ancient castle upon an island, overhung by a huge promontory; the whole embowered with wood, so as to have a most romantic appearance. Issuing from Loch Dochart, the river retains that name, and gives the appellation of Glen-Dochart to the vale through which it runs. At the eastern extremity of this valley, the water is again detained in its course; and being augmented by the river Lochay, the united streams form one of the most beautiful of the Scottish lakes, called Loch Tay. Issuing hence, the river assumes the name of the lake, which name it retains till it mingles with the waters of the ocean. The valley through which it passes may be considered as the paradise of the Highlands. On Loch Tay, and the river for  
some

some miles below it, the banks are richly cultivated, or covered with beautiful plantations, the whole overlooked and sheltered by mountains towering to the clouds; among which rises the lofty Benlawers, the third mountain in point of height in the island. Here, near the village of Kenmore, is the magnificent feat of the earl of Breadalbane, called Taymouth; and in this valley, although the parishes are twenty, thirty, or forty miles in extent, several parish-churches are situated in a tract of a few miles; a circumstance which demonstrates the discernment of the clergy in ancient times in selecting their place of residence. After leaving the lake about two miles, the Tay acquires a great increase from the waters of the Lyon; at Logierat it receives the united streams of the Garry and the Tummel, and becomes a river of uncommon size and beauty. Near Dunkeld it is increased by the waters of the Bran, and receiving in its course the Isla, with its tributary streams from the east, and the Almond from the west, proceeds by Perth between the hills of Kinnoul and Moncrieff, till it meets the Earn, after which it proceeds eastward, forming the estuary or Frith of Tay; which expands to the breadth of three miles, but contracts to two miles as it approaches Dundee, about eight miles below which, it pours its waters into the German ocean. The hills of Kinnoul and Moncrieff afford extensive prospects; that from the latter is denominated by Pennant the "Glory of Scotland." The Tay is navigable as far as Newburgh, in Fife, for vessels of 500 tons; and vessels of considerable size can go up as far as Perth. The Frith of Tay is not so commodious as that of the Forth; but from the Buttonnoffs or Barry sands to Perth (an extent of nearly forty miles), the whole may be considered as a harbour; having the county of Fife on one side, and those of Angus and Perth on the other. There are fewer great falls of water on the Tay than in most other rivers which rise in a highland district; but it possesses several cascades of considerable height, particularly at the Linn of Campsie, near its junction with the Isla, where the water is precipitated over a huge basaltic dike into a pool of great depth.—*Beauties of Scotland*, vol. iv. Perthshire, 1806. *Gazetteer of Scotland*, 1806.

TAY, *Loch*, a lake in Perthshire, Scotland, extends about fifteen miles in length from the village of Killin, its western extremity, to its eastern termination at the village of Kenmore; its breadth is only from one to two miles. Its depth varies in different parts, from fifteen to a hundred fathoms. The banks on both sides are fertile, and finely diversified by the windings of the coasts and the varied appearances of the mountains. On a small promontory near the eastern extremity, are the church and village of Kenmore, near which, on a small island covered with trees, stand the ruins of a priory, which was dependent on the religious establishment of Seone. It was founded, in 1122, by king Alexander I., who deposited there the remains of his queen Sybilla, the natural daughter of Henry I. of England. On the death of Alexander the priory was more liberally endowed, that the monks might perform masses for the repose of his soul, as well as for that of his queen. The loch abounds with salmon, pike, perch, eels, charr and trout. The salmon are peculiarly excellent; the fishery for which commences in December, and ends on the 26th of August. The earl of Breadalbane has the exclusive right of fishing there at all seasons. This privilege was originally granted for the purpose of supplying fish for the monks of the priory, and at the dissolution was, with the island, claimed by this noble family. The waters of this lake have at times suffered violent and unaccountable agitation. An ample account of one of these phenomena, which

occurred on Sunday, September 12, 1780, is published in the first volume of the Transactions of the Royal Society of Edinburgh. It was written by Mr. Fleming, late minister of Kenmore. He states, that "about nine o'clock in the morning the water was observed to retire about five yards within the ordinary boundary, and in four or five minutes to flow out again. In this manner it ebbed and flowed successively three or four times within the space of a quarter of an hour, when all at once the water rushed from the east and west in opposite currents, and rose in the form of a great wave to the height of five feet above the ordinary level, leaving the bottom of the bay dry to the distance of between ninety and an hundred yards from its natural boundary. When the opposite currents met, they made a clashing noise and foamed; and the stronger impulse being from the east, the wave, after rising to its greatest height, rolled westward, but slowly diminishing as it went, for the space of five minutes, when it wholly disappeared. As the wave subsided, the water flew back with some force, and exceeded its original boundary four or five yards; then it ebbed again about ten yards, and again returned, and continued to ebb and flow in this manner for the space of two hours, the ebbings succeeding each other at the distance of about seven minutes, and gradually lessening, till the water settled into its ordinary level. During the whole time that this phenomenon was observed, the weather was calm. It could scarcely be perceived that the direction of the clouds was from north-east." On the 13th of July, 1794, the loch experienced agitations similar to those described by Mr. Fleming, but they were neither so violent nor so long continued.—*Beauties of Scotland*, vol. iv. Perthshire.

TAY, a river of Ireland, in the county of Waterford, which runs into the sea, 7 miles W.N.W. from Dungarvan bay.

TAYA, a river of Austria, which rises near Schweigers, passes by Drosendorf, and enters Moravia, passes by Znaym, Laab, &c. and joins the March, 4 miles N.N.E. of Hockenau.—Also, a small island in the Indian sea, near the west coast of Siam. N. lat.  $7^{\circ} 38'$ . E. long.  $98^{\circ} 30'$ .

TAYABO, a town on the east coast of the island of Celebes, in Gunong-Tellu bay. S. lat.  $1^{\circ} 10'$ . E. long.  $121^{\circ} 30'$ .

TAYASAN, a town on the east coast of the island of Negros. N. lat.  $10^{\circ} 18'$ . E. long.  $123^{\circ} 3'$ .

TAYBA, a ruined town in the deserts of Syria, which shews in its present state, evident marks of its former magnificence.

TAYECUA, a town of South America, in the province of Darien; 30 miles W. of St. Marie de Darien.

TAYGETA, in *Ancient Geography*, a river of the Peloponnese, in Laconia.

TAYGETUS, a mountain of Laconia, S.W. of Bryfées, being a portion of a small chain of mountains on the promontory of Tenarus, on the frontiers of Arcadia. It was famous for the abundance of its game. On this mountain was a place consecrated to the sun, called by Pausanias "Talet." Here they sacrificed, among other victims, horses.

TAYKYATT, a long and straggling town of the Birman empire, on the W. side of the Irawaddy; 5 miles W.N.W. of Yeoungbenzah.

TAYL, in *Heraldry*. See TAIL.

TAYLOR, Brook, LL.D. and F.R.S., in *Biography*, an eminent mathematician, was born of a good family, at Edmonton, near London, in the year 1685. In early life he devoted himself to music, drawing, and painting, in which he was reckoned to excel. At the same time he pursued his

his classical studies and mathematics under a private tutor; and in 1701, at the age of 15, he was entered a fellow-commoner at St. John's college, in the university of Cambridge. Such was his assiduity in the prosecution of mathematics, that in 1708 he composed his treatise "On the Centre of Oscillation," which was published in the *Phil. Transf.* In the next year he took his degree of bachelor of laws, and in 1712 he was elected fellow of the Royal Society. By a letter addressed to Mr. Machin, dated in this year, it appears that he had then given a solution of Kepler's famous problem, pointing out its importance and use. He also at the same period presented to the Society three papers, *viz.* "On the Ascent of Water between two Glass Planes;" "On the Centre of Oscillation;" and "On the Motion of a stretched String." In consideration of his services to the Society, and distinguished qualifications for the office, he was elected their secretary in 1714, taking in the same year his degree of doctor of laws at Cambridge. In 1715, he published his "Methodus Incrementorum;" a curious essay, preserved in the *Phil. Transf.* entitled, "An Account of an Experiment for the Discovery of the Laws of Magnetic Attraction;" and also a treatise, of high value and reputation, "On the Principles of Linear Perspective." His correspondence this year with count de Montmort on the tenets of Malebranche was ably conducted, and gained for him an eulogy from the French academy; and in 1716, on his visit to Paris, he was treated with great personal respect. Upon his return to London, in 1717, he composed three treatises, published in the 30th volume of the *Phil. Transf.*; the titles of which are, "An Attempt towards an Improvement of the Method of approximating in the Extraction of Roots of Equations in Numbers;" "A Solution of Demoiivre's 15th Problem, with the Assistance of Combinations and infinite Series;" and "A Solution of the Problem of G. G. Leibnitz proposed to the English." His health being impaired by intense application, he was obliged to seek relief at Aix-la-Chapelle. Upon his return, in 1719, he directed his attention to studies very different from those to which he had been accustomed; and the fruits of these studies have been found among his papers by his grandson sir William Young, in detached fragments of a treatise on the Jewish sacrifices, and a dissertation on the lawfulness of eating blood. His leisure hours were still devoted to the application of mathematics in the improvement of the arts; and with this view he revised his treatise on Linear Perspective, which appeared in a new and enlarged form. Drawing was also a favourite amusement. His treatise on Linear Perspective, which has been held among mathematicians in the highest estimation, produced at this time a controversy, which terminated in a very serious misunderstanding, between him and J. Bernouilli. This treatise, abstruse to those who consult it for mere practical purposes, was rendered more plain and perspicuous by Mr. Kirby, in an edition, entitled "Brook Taylor's Perspective made easy." Our author's answer to Bernouilli is preserved in the 30th volume of the *Phil. Transf.* Soon after his return to England in 1721, he published the last paper that appears with his name in the *Phil. Transf.* entitled "An Experiment made to ascertain the Proportion of Expansion of Liquor in the Thermometer, with regard to the Degree of Heat."

Dr. Taylor was twice married: his second wife was a daughter of John Sawbridge, esq. of Olantigh in Kent. On the death of his father, in 1729, he succeeded to the family estate of Biffons in Kent, and in the following year his wife died in child-bed. About this time he probably wrote the essay, entitled "Contemplatio Philosophica,"

published by sir W. Young in 1793. But though his mind might have thus obtained temporary relief, he survived his wife little more than a year, and died of a decline in the 46th year of his age, December 1731. "I am spared," says his descendant, "the necessity of closing this biographical sketch with a prolix detail of his character, in the best acceptance of duties, relative to each situation of life in which he was engaged; his own writings, and the writings of those who best knew him, prove him to have been the finished Christian, gentleman, and scholar." Life by his grandson, sir William Young, prefixed to his Posthumous Works.

TAYLOR, JEREMY, an eminent divine and prelate of the established church in Ireland, was the son of a barber at Cambridge, where he was born in the early part of the 17th century. At the age of 13 he was admitted at Gonville and Caius college in the university of that place, where he remained till he took the degree of M.A. Having taken orders, he occasionally preached in London, and obtained by the interest of archbishop Laud, in 1636, a fellowship of All Souls' college, Oxford. Here he resisted attempts that were made to profelyte him to popery, and became more established in Protestant principles. Laud appointed him one of his chaplains, and procured for him the rectory of Uppington, in which he settled about the year 1640, at which time he surrendered his fellowship and married. In 1642 he was chaplain in ordinary to Charles I., and served his cause by writing in defence of the church of England. When the parliament became victorious, his living was sequestered, and he retired into Wales, where he was kindly received by the earl of Carbery, of Golden Grove, near Llandilo, in Carmarthenshire; under whose protection he exercised his ministry, and kept a school for the support of his family. In this state of retirement, he composed those discourses, which caused him to be held in high estimation, as one of the first writers in the English language, "with respect to fertility of conception, eloquence of expression, and comprehensiveness of thought." At this period the death of three hopeful sons disturbed his tranquillity, and rendered it necessary for him to change the scene and to remove to London, where he exposed himself to considerable danger by officiating in a private congregation of loyalists. Invited by Edward lord Conway to his seat at Portmore in the county of Antrim, he remained in Ireland until the Restoration. On that event he came over to England, and in January 1660-1, his services were recompensed by the promotion to the sees of Down and Connor. He was also made privy-counsellor of Ireland, and appointed to the administration of the bishopric of Dromore, and honoured with the office of vice-chancellor to the university of Dublin. In these high and responsible stations he paid sedulous attention to his official duties, exhibited an example of piety, humility, and charity; and employed so great a part of his income in doing good, both privately and publicly, that when he died at Lisburne in 1667, he left only moderate portions to his three daughters. His person was comely, his manners were polite, his voice was melodious, and his conversation was agreeable. Of his works, which were numerous, consisting chiefly of sermons and devotional pieces, and printed in four, and also in six volumes, folio, the most remarkable is entitled, "Theologia Eclectica, or a Discourse on the Liberty of Prophesying; shewing the unreasonableness of prescribing to other men's faith, and the iniquity of persecuting different opinions," 4to. first published in 1647. The author, when this book was written, belonged to a vanquished and persecuted party; and he strongly and boldly pleads for liberty of conscience, and the rights of individuals to judge for themselves in matters of religion.

religion. This work, considering the time in which it was written, and the connections of the author, indicates a very enlightened mind with regard to the subjects of discussion; and it is perused with no small degree of interest in the present period of greater knowledge and liberality. With respect to toleration, however, we observe, that he limits it to such doctrines as are not inconsistent with society or the public good;—a limitation which is capable of being much misconstrued and misapplied. Having asserted, as a first principle, that “the duty of faith is completed in believing the articles of the Apostles’ creed,” he could not consistently approve the imposition of stricter creeds. Of the Athanasian creed he thus speaks: “If I should be questioned concerning the symbol of Athanasius, I confess I cannot see that moderate sentence and gentleness of charity in his preface and conclusion, as there was in the Nicene creed. Nothing there but damnation and perishing everlastingly, unless the article of the Trinity be believed, as it is there with curiosity and minute particularities explained. Besides, if it were considered concerning Athanasius’s creed, how many people understand it not, how contrary to natural reason it seems, how little the scripture says of those curiosities of explication, and how tradition was not clear on his side for the article itself, much less for those forms and minutes,—and after all this, that the Nicene creed itself went not so farre, neither in article, nor anathema, nor explication, it had not been amiss if the final judgment had been left to Jesus Christ.”

This celebrated work did not escape invidious criticism and severe animadversion. Among others we may mention Anthony Wood, who, with censurable illiberality, suggested, that Taylor in this book, and Hales in his tract on Schism, employed their arguments as a stratagem by way of raising factions among the Presbyterians, and dissolving their union. The most popular of Taylor’s other writings, have been his “Golden Grove, or Manual of daily Prayers;” his treatise on “Holy Living and Dying;” and his “Ductor Dubitantium, or Rule of Conscience.” Dr. Dodwell long since observed, and not unjustly, that “Dr. Taylor, in his voluminous writings, said many lively things, which will not bear a strict examination.” *Biog. Brit. Gen. Biog.*

TAYLOR, JOHN, D.D. a learned and highly respectable divine among Protestant Dissenters, was born in the year 1694, at or near Lancaster. After having received his education at Whitehaven under Dr. Dixon and others, he was nominated by one of the Disney family to the chapel of Kirkstead, in Lincolnshire, exempt from ecclesiastical jurisdiction, and which had been occupied from the latter end of the preceding century by dissenting ministers. Here he lived, on a small salary aided by a school, for 18 years; and laid a foundation for the theological celebrity, which he afterwards acquired by a diligent study of the scriptures in their original languages. In this obscure and retired situation he did not escape notice; and in the year 1733, he complied with an invitation from the Presbyterian congregation at Norwich. To his congregation, which had been before his settlement served by Calvinistic ministers, he recommended the perusal of Dr. Clarke’s *Scripture-Doctrine of the Trinity*. His first publication was “*A Prefatory Discourse to Mr. Joseph Rawson’s Case*,” who, in 1736, had been excluded from communion with the congregational church at Nottingham, for refusing his assent to a declaration required of him concerning the Trinity; in which he ably defended the right of Christians to deduce their faith from the scriptures, without the intervention of creeds and subscriptions. His first avowed attack upon Calvinistic theology, was the publication of his “*Scripture-Doctrine of*

*Original Sin*,” which first appeared in 1740. This excited alarm and animadversion. (For an account of this controversy, see the article *Original Sin*.) Dr. Taylor’s supplement was published in 1741. This was succeeded, in 1745, by “*A Paraphrase on the Epistle to the Romans, with a Key to the Apostolic Writings*.” This “*Key*” was well received, and has been highly commended. The late learned Dr. Watson, bishop of Llandaff, has given it a place in his “*Theological Tracts*,” and archdeacon Paley recommends a careful perusal of the Paraphrase on the Romans to candidates for priests’ orders. The labours of his subsequent years produced several small tracts, and particularly his “*Scripture-Doctrine of Atonement*,” but his opus majus, as we may justly denominate it, was his “*Hebrew Concordance*,” in folio, the first volume of which appeared in 1754, and the second in 1757. This work, which does immortal honour to the critical skill and indefatigable assiduity of the author, was encouraged by a great number of subscribers, among whom we may enumerate twenty-two English, and fifteen Irish bishops. Soon after the publication of this performance, the author was presented by the university of Glasgow with the degree of D.D. In 1754 he published a pamphlet, entitled “*The Lord’s Supper explained upon Scripture Principles*,” and in 1757 appeared a defence of infant baptism, entitled “*The Covenant of Grace*.” Dr. Taylor was happily situated at Norwich, and received every testimony of respect to which his learning and character entitled him; but a scene of more public and general usefulness was opened to him in the year 1757, when he was invited to supply the place of divinity-tutor at the newly-founded academy of Warrington, in Lancashire. But here his situation was rendered unpleasant to him; and some events occurred which affected his health and spirits. Although he performed his official duties for some time amidst the disquiets which he experienced, he was at length carried off, by an unperceived death, during the night of March 5, 1761, at the age of 66 years. At Warrington he published two pamphlets, *viz.* “*An Examination of the Scheme of Morality advanced by Dr. Hutcheson, late Professor of Morality in the University of Glasgow*,” and “*A Sketch of Moral Philosophy*,” for the use of his class. He also prepared for the press “*The Scripture Account of Prayer, in an Address to the Dissenters in Lancashire*,” in consequence of the introduction of a liturgy at Liverpool, an innovation in the accustomed mode of worship among Dissenters which he disapproved. His posthumous work, entitled “*A Scheme of Scripture Divinity*,” was published by Mr. Richard Taylor of Norwich, his eldest surviving son; and it was held in such estimation by the late bishop of Llandaff, as to form a part of his *Collection of Tracts*. As a preacher, Dr. Taylor was plain and simple in his language, but dignified and impressive; and he excelled in a critical explanation of difficult passages of scripture. He had the merit of introducing into the congregation at Norwich a spirit of liberal enquiry, which, we are informed, still continues. *Memoir on the Life of Dr. John Taylor of Norwich.*

TAYLOR, JOHN, LL.D., the son of a barber at Shrewsbury, was born about the year 1703, and distinguished himself as a scholar and critic. After a course of preparatory education in his native town, he was entered at St. John’s college in Cambridge, and became a fellow of it in the year 1730, in which year he published two Latin academical orations. In 1732 appeared proposals for an edition of *Lyfias*. He was first librarian and afterwards registrar of the university. His “*Lyfias*,” Gr. and Lat., with the conjectures of Markland, was published from the press of

Bowyer, in 1739; and a new edition, with Taylor's version and notes, was printed at Cambridge in the following year. Upon taking his degree of LL.D. he delivered and published a dissertation under the title of "Commentarius ad legem decemviralem de inope debitorum in partes dissectando." In 1743, he published "Orationes duæ; una Demosthenis contra Meidiam; altera Lycurgi contra Leoceratem," Gr. and Lat. with notes and emendations; and in the following year, "Marmor Sandvicense, cum Commentario et Notis," being a dissertation on an Athenian marble brought to England by lord Sandwich, bearing the oldest inscription of known date.

In 1741, Dr. Taylor had been admitted an advocate in Doctors' Commons, and in 1744 he was made chancellor of Lincoln. He afterwards took orders, and printed a sermon preached at Bishop-Stortford in 1749. He was presented to the archdeaconry of Buckingham, to the rectory of Lawford, Essex; and in 1757 to a residentiaryship of St. Paul's. In 1755, still prosecuting his legal studies, he published "Elements of the Civil Law," 4to. reprinted in 1769. An abridgment of this learned work, entitled "A Summary of the Roman Law," was published in 1773.

Dr. Taylor held also the offices of commissary of Lincoln and of Stowe: he was a member of the Royal and Antiquarian Societies; and of the latter he was one of the vice-presidents. At the time of his death, his long-promised edition of Demosthenes was just finished, in two vols. 8vo. at the university press, Cambridge; and the notes were afterwards added, together with part of an appendix to Suidas. The character of Dr. Taylor was that of an amiable and disinterested man; and the world was deprived of his learned labours in April 1766. To the works already mentioned, we may add some remarks inserted in Foster's "Essay on Accent and Quantity," and various pieces of poetry, printed in the Gentleman's Magazine, and in Nichols's "Select Collection of Poems." Anecd. of Bowyer. Month. Rev. Gen. Biog.

TAYLOR, HENRY, A.M. a very respectable clergyman of the established church, was the son of William Taylor, merchant of London, and born at Southweald, in Essex, in May 1711. The rudiments of his education he received at Mr. Newcome's school, in the parish of Hackney, and there he formed an early friendship with Mr. John Hoadly, son of Dr. Benjamin Hoadly, bishop of Winchester. From Hackney he removed to Queen's college, in the university of Cambridge, and having completed his education with a view to the church, he took orders, and commenced the exercise of his ministerial duties as a preacher with singular acceptance. His talents and acquirements, as well as his voice and manner of delivery, which were peculiarly pleasing, recommended him to public notice, and he ranked high in the estimation of those friends with whom he intimately associated. His first preferment was the rectory of Whitfield, in Oxfordshire, which he held for a minor. In 1755 he was presented by bishop Hoadly to the rectory of Crawley, in Hampshire, which he afterwards held in connection with the vicarage of Portsmouth, in exchange for a living in Hampshire, which he had held with Whitfield. He married Miss Christian Fox, daughter of the Rev. Francis Fox, rector of St. Mary's, Rotherhithe, who died in the year 1769; and by her he had four sons and two daughters. His course of literary and clerical labour terminated in April, 1785, and he was interred at Crawley.

Having recited the few particulars which we could collect concerning the private life of Mr. Taylor, we shall now subjoin a list of his publications, some having his name and others

being anonymous. In 1760 he published "An Essay on the Beauty of the Divine Economy; being the Substance of a Sermon (with many and large Additions) preached at the Visitation of the Lord Bishop of Winchester, held by the Worshipful and Reverend Dr. John Hoadly, Chancellor of the Diocese, on Tuesday September 18, 1759, at the cathedral Church of Winchester, and published at the Desire of Mr. Chancellor and the Clergy."—"A full Answer to a late View of the internal Evidence of the Christian Religion, in a Discourse between a rational Christian and his Friend," 1771.—"A Tract against Warburton," 1772.—"Confusion worse confounded, Rout on Rout; or the Bishop of Gloucester's Commentary upon Rice or Arise Evans's Echo from Heaven, examined and exposed by *Indignatio*," London, 1772. Anonymous. "Two Letters; viz. 1. A Letter to the Earl of Abingdon, in which His Grace of York's Notions of Civil Liberty are examined by *Liberalis*, published in the London Evening Post, November 6, 1777. 2. *Vera Icon*; or a Vindication of His Grace of York's Sermon, preached on February 21st, 1777; proving it to contain a severe Satire against the Ministry, and a Defence of civil and religious Liberty, upon the well-known Principles of Whiggism; in answer to a Letter from *Liberalis* to the Earl of Abingdon, by *Mythagogus Candidus*."—"The Apology of Benjamin Ben Mordecai to his Friends, for embracing Christianity; in seven Letters to Elisha Levi, Merchant of Amsterdam; with Notes and Illustrations, by the Author and the Editor." Lond. 1771. 1773, 1774, 4to. The first of these letters contains an account and examination of the various opinions among Christians, concerning the nature and person of Christ. In the second, third, and fourth letters, it is proposed to shew from scripture, that the Logos was the angel of the covenant, and to prove the same from the most approved commentators on scripture, both ancient and modern, both Jewish and Christian; and to demonstrate that Jesus was the Messiah. The fifth, sixth, and seventh letters contain preparatory principles to the Christian scheme of redemption; giving the scheme of Christianity itself, and shewing it to be one, plain, regular, and consistent system of divine economy, from the beginning of the world to the end; and containing proofs, illustrations, answers to objections, and an examination of Mr. Hume's notion of miracles.—"Thoughts on the Nature of the Grand Apostacy, with Reflections and Observations on the Fifteenth Chapter of Mr. Gibbon's History of the Decline and Fall of the Roman Empire; to which are added three dissertations: 1. On the Parousia of Christ; 2. On the Millennium; 3. On the late Rev. Mr. Richard Wood, on Prophecy," 1781.—"Farther Thoughts on the Nature of the Grand Apostacy of the Christian Churches, foretold by the Apostles; with Observations on the Laws against Heresy, the Subscription to Articles of Human Composition, and other Subjects of the utmost Importance to the Religion of Protestants, and to Christianity in general," 1783.—"Considerations on Ancient and Modern Creeds compared; the Supremacy of the Father; the personal Existence of the Holy Spirit; the Pre-existence of Christ and his Divinity, &c." published after the author's death by his son, the Rev. Henry Taylor, rector of Spridlington, Lincolnshire, 1788.

Mr. Taylor, who was of a sprightly, cheerful disposition, occasionally amused himself in writing verses; some of which, particularly his "Paradise Regained," are published in Doddsley's Collection.

On Mr. Taylor's principles and character it is needless to enlarge. His conduct in private and social life corresponded to his clerical profession: to the sentiments of bishop Hoadly, in church and state, he was invariably attached; he joined the  
petitioning

petitioning clergy in their application for an enlargement of the terms of conformity; and he avowed himself on all occasions, without disguise, the friend and advocate of civil and religious liberty. In his theological opinions, he considered himself as coinciding more nearly with Apollinaris, than with any other.

TAY-MING, in *Geography*, a city of China, of the first rank, in Pe-tche-li; 232 miles S.S.W. of Peking. N. lat.  $36^{\circ} 20'$ . E. long.  $114^{\circ} 49'$ .

TAYNG, a town of Corea; 25 miles S.E. of Haimen.

TAYWAN, or TAI-OUAN, the capital of *Formosa*; which see.

TAZ, a river of Russia, which rises from two lakes, Ku and Din, and runs into the Tazovskaia gulf, N. lat.  $67^{\circ} 35'$ . E. long.  $80^{\circ} 14'$ .

TAZABUCO, a town of Peru; 46 miles E.N.E. of La Plata.

TAZATA, in *Ancient Geography*, an island of the Caspian sea, near the coast of Hyrcania. Pliny. It is called Talca by Ptolemy, and Talga by Mela.

TAZEE, in *Geography*, a town of Candahar; 70 miles E. of Candahar.

TAZEWELL, a post-town of Tennessee; 517 miles W.S.W. of Washington.

TAZINA, in *Ancient Geography*, a town of Asia, in Media.

TAZLA, or SALATO, in *Geography*, a lake of Asiatic Turkey, 36 miles long, and 2 broad; 30 miles N. of Cogni.

TAZLA, a town of Asiatic Turkey, in Caramania; 28 miles N. of Cogni.

TAZOVSKAIA, a gulf or bay in the Obkskaia gulf, formed by the waters of several rivers of Siberia, and joined to the Obkskaia gulf, about 140 miles in length, and 3 in breadth. N. lat.  $67^{\circ} 40'$  to  $69^{\circ}$ . E. long.  $76^{\circ}$  to  $80^{\circ}$ .

TAZREE, a town of Persia, in the province of Laristan; 15 miles N.E. of Tarem.

TAZUS, TACHELY, in *Ancient Geography*, a town in the interior of the Tauric Chersonesus, E. of Portacra, mentioned by Ptolemy.—Also, a town of Asiatic Sarmatia, upon the northern coast of the Euxine sea.

TAZZETTA, in *Botany*, the specific name chosen by Linnæus, who spells it incorrectly, for the Polyanthus Narcissus. (See NARCISSUS.) The word is Italian for a small cup, and De Theis supposes it was first applied in Italy to this flower, which is much cultivated there, and usually imported from thence, in its highest perfection, by our florists. Still we do not see how Linnæus came to adopt this name, nor, indeed, how it fell in his way.

TCHA. See TEA.

TCHA, or *Cangua*, in *Geography*. See CANGA.

TCHABA, a town of Asiatic Turkey, in Natolia; 18 miles E. of Boli.

TCHABAR, a river of Chinese Tartary, which runs north into the Songarie.

TCHABISCHI, a town of Russia, in the government of Irkutsk, on the Amur; 40 miles N.N.E. of Stretensfk.

TCHACAHAMAR, a town of Thibet; 10 miles W. of Orto.

TCHACAOSO, a town of Thibet; 25 miles S. of Chatcheou.

TCHACA-TCHOUTCHI, a town of Thibet; 30 miles N.W. of Tchontori.

TCHACA-TOHOI, a town of Chinese Tartary, in the country of Hami; 15 miles N.W. of Quatcheou.

TCHADOBSKO, a town of Russia, in the government of Tobolsk, on the Tunguska; 212 miles E. of Eniseisk.

TCHAGANSKOI, a fortress of Russia, on the Ural; 16 miles S. of Uralsk.

TCHAGODO, a town of Russia, in the government of Novgorod, on the lake Voz; 240 miles N.E. of Novgorod. N. lat.  $60^{\circ} 30'$ . E. long.  $38^{\circ} 44'$ .—Also, a river of Russia, which rises near Suchotzkoi, in the government of Novgorod, and runs into the Mologa, 16 miles N. of Uftuzna.

TCHAHAN HOTUN, a town of Chinese Tartary; 260 miles N. of Peking. N. lat.  $43^{\circ} 58'$ . E. long.  $117^{\circ} 29'$ .

TCHAHAN Hamer, a town of Chinese Tartary; 38 miles S.W. of Coucou.

TCHAHAN Soubarkan Hotun, a town of Chinese Tartary; 163 miles N.N.E. of Peking. N. lat.  $41^{\circ} 38'$ . E. long.  $118^{\circ} 44'$ .

TCHAHASOU HOTUN, a town of Chinese Tartary; 683 miles N.N.E. of Peking. N. lat.  $49^{\circ} 34'$ . E. long.  $127^{\circ} 42'$ .

TCHAHAI, a town of Persia, in the province of Chorasana, or Khorassan; 258 miles N. of Herat.

TCHAIJA, a river of Russia, which runs into the Lena, near Tchamska, in the government of Irkutsk. N. lat.  $58^{\circ} 5'$ . E. long.  $109^{\circ} 34'$ .

TCHAIKAN, a town of Corea; 28 miles W. of Outchuen.

TCHAI-YAM, a river of China, which joins the Lo, 15 miles W.S.W. of Pao-king.

TCHAKAN-TOTOHO KIAMEX, a post of Chinese Tartary, in the country of the Monguls; 18 miles S.E. of Kara-Hotun.

TCHAKET, a town of Asiatic Turkey, in Aladulia; 15 miles N. of Adana.

TCHAKTELA, a town of Asiatic Turkey, in Caramania; 27 miles N. of Akhehr.

TCHAL, a town of Kurdistan, or Curdistan; 28 miles E. of Amadieli.

TCHALBISCHEVO, a town of Russia, in the government of Tobolsk; 20 miles S. of Eniseisk.

TCHALMOZA, a town of Russia, in the government of Olonetz, on the north-east coast of lake Onezskoe; 32 miles S.E. of Povenetz.

TCHAM, a town of Corea; 420 miles E. of Peking.

TCHAMDSOU-TIGAC, a lake of Thibet, about 36 miles in circumference. N. lat.  $31^{\circ} 30'$ . E. long.  $81^{\circ} 26'$ .

TCHAMNAGOM-DOU, a lake of Thibet, about 36 miles in circumference. N. lat.  $30^{\circ} 50'$ . E. long.  $93^{\circ} 54'$ .

TCHAMSKA, a town of Russia, in the government of Irkutsk; 64 miles E.N.E. of Kirensk.

TCHAM-TCHIM HOTUN, a town of Corea; 415 miles E. of Peking. N. lat.  $40^{\circ} 9'$ . E. long.  $124^{\circ} 46'$ .

TCHAM-TIEN, a town of Chinese Tartary; 43 miles N.W. of Siao-ku-leou.

TCHAMTOU, a town of Thibet; 54 miles S.W. of Contchoudfong.

TCHANG, a lake of China, about 20 miles in circumference; 40 miles N.E. of Tein-tcheou.

TCHANG-CHAN, or CHAN-SAN, a small island in the Chinese sea, and most southerly of those called Mia-tou; 18 miles N.W. of Teng-tcheou.

TCHANG-FONG, a town of Corea; 63 miles E.S.E. of King-ki-tao.

TCHANG-HOA, a town of China, of the third rank, in the isle of Hainan; 42 miles S.W. of Tchen-tcheou.

TCHANG-ING, a town of Corea; 40 miles S. of Kang.

**TCHANG-KIA-KEOU**, a gate on the great wall, which separates China from Tartary, in the northern part of Pe-tche-li, the principal passage by which the Tartars enter China; 90 miles N.N.W. of Peking.

**TCHANG-PING**, a town of Corea; 15 miles E. of Koang-tcheou.—Also, a city of China, of the second rank, in Pe-tche-li; 20 miles N.N.W. of Peking. N. lat.  $40^{\circ} 14'$ . E. long.  $115^{\circ} 37'$ .

**TCHANG-SING**, a town of Corea; 35 miles S. of Koang-tcheou.

**TCHANG-SONG**, a town of Corea; 33 miles N.W. of Kang-tcheou.

**TCHANG-TCHA**, a city of China, of the first rank, in Hou-quang, on the Heng river. The inhabitants of this city have given occasion to a great festival, which is celebrated in the fifth month throughout the empire. The mandarin who governed this city, and was much esteemed and beloved by the people for his probity and virtue, happening to be drowned in the river, they instituted a festival to his honour, which is celebrated by sports, and feasts, and fights upon the waters, as if they intended to search for the mandarin, the object of their love and grief. This festival, which was at first peculiar to this city, came afterwards to be observed throughout the empire; 742 miles S. of Peking. N. lat.  $28^{\circ} 11'$ . E. long.  $112^{\circ} 25'$ .

**TCHANG-TCHEOU**, a city of China, of the first rank, in Fo-kien; 950 miles S. of Peking. N. lat.  $24^{\circ} 32'$ . E. long.  $117^{\circ} 34'$ .—Also, a city of China, of the first rank, in Kiang-nan; 525 miles S.S.E. of Peking. N. lat.  $31^{\circ} 50'$ . E. long.  $119^{\circ} 29'$ .

**TCHANG-TE**, a city of China, of the first rank, in Hou-quang; 717 miles S.S.W. of Peking. N. lat.  $29^{\circ} 2'$ . E. long.  $111^{\circ} 2'$ .

**TCHANG-YUEN**, a town of Corea; 60 miles W.S.W. of Ho-ang-tcheou.—Also, a town of Corea; 30 miles S.E. of Kang-tcheou.

**TCHANI**, a lake of Russia, in the government of Kolivan, upwards of 200 miles in circumference; 100 miles W.N.W. of Kolivan.

**TCHANKOUR**, a town of Thibet; 105 miles S.E. of Sourman.

**TCHAN-TE**, a city of China, of the first rank, in Ho-nan. This is one of the most northern cities of the province. Two things are here remarkable: the first is a fish resembling a crocodile, the fat of which is of such a singular nature, that when once kindled it cannot be extinguished; the second is a mountain in the neighbourhood, so steep and inaccessible, that in time of war, it affords a place of refuge to the inhabitants, and a safe asylum from the insults and violence of the soldiery. Tchan-te contains in its district one city of the second class, and six of the third; 255 miles S.S.W. of Peking. N. lat.  $36^{\circ} 6'$ . E. long.  $114^{\circ}$ .

**TCHAO-KING**, a city of China, of the first rank, in Quang-tong, on the river Si; 1062 miles S.S.W. of Peking. N. lat.  $23^{\circ} 3'$ . E. long.  $111^{\circ} 44'$ .

**TCHAO-NAIMAN-SOUMI-HOTUN**, a town of Chinese Tartary; 198 miles N. of Peking. N. lat.  $42^{\circ} 28'$ . E. long.  $115^{\circ} 44'$ .

**TCHAO-TCHEOU**, a city of China, of the first rank, in Quang-tong, on the Pe-kiang; 1007 miles S. of Peking. N. lat.  $23^{\circ} 37'$ . E. long.  $116^{\circ} 21'$ .

**TCHAOUTCHE-AGHISI**, a town of Asiatic Turkey, in Natolia, on the Black sea; 12 miles N.W. of Erekli.

**TCHAPIE-DSAKE-TOMPSOU**, a lake of Thibet, about 54 miles in circumference. N. lat.  $32^{\circ} 12'$ . E. long.  $84^{\circ} 34'$ .

**TCHARKAZ**. See ZARCHAS.

**TCHARONDA**, a town of Russia, in the government of Novgorod, on the Sula; 188 miles E.N.E. of Novgorod. N. lat.  $59^{\circ} 40'$ . E. long.  $37^{\circ} 34'$ .

**TCHASIRCONG**, a town of Thibet, near the Ganges; 24 miles E. of Latac.

**TCHASTIJA**, an island of Russia, in the government of Irkutsk, on the Lena; 112 miles N.E. of Kirensk.

**TCHAT**, a mountain of Thibet, on the frontiers of Yarkan. N. lat.  $33^{\circ} 10'$ . E. long.  $78^{\circ} 44'$ .

**TCHATELI**, a town of Chinese Tartary, in the country of Hami; 38 miles N.W. of Hami-Hotun.

**TCHAUNSKAIA**, a gulf on the northern coast of Russia, in the Frozen sea. N. lat.  $71^{\circ}$  to  $72^{\circ}$ . E. long.  $166^{\circ}$  to  $169^{\circ}$ .

**TCHAUSI**, a town of Russia, in the government of Mogilev, on the Soz; 40 miles S.E. of Mogilev. N. lat.  $53^{\circ} 36'$ . E. long.  $31^{\circ} 14'$ .

**TCHAZMIUNSKOI**, a cape on the east coast of Kamtschatka; 52 miles S. of Verchnei Kamtschatkoi. N. lat.  $55^{\circ} 48'$ . E. long.  $160^{\circ} 15'$ .

**TCHERBAKSAR**, a town of Russia, in the government of Kazan, on the Volga; 64 miles W.N.W. of Kazan. N. lat.  $56^{\circ} 24'$ . E. long.  $40^{\circ} 30'$ .

**TCHERBARKULSKAIA**, a fortress of Russia, in the government of Upha; 132 miles E. of Upha.

**TCHECHUL**, a river of Russia, which runs into the Lena, nearly opposite Ilnska.

**TCHECO**, a town of Thibet; 93 miles E.S.E. of Laffa.

**TCHFTKAN**, a town of Asiatic Turkey, in Adalia; 45 miles N.N.W. of Adana.

**TCHEGEN**, an island in the Caspian sea; 144 miles S. of Atrachan.

**TCHEGOTCHINA**, a river of Russia, which runs into the Kolima, N. lat.  $68^{\circ}$ . E. long.  $150^{\circ} 14'$ .

**TCHEGUEDE HOTUN**, a town of Chinese Tartary, on the east bank of the Amur, opposite Teldom; 673 miles N.N.E. of Peking. N. lat.  $49^{\circ} 26'$ . E. long.  $127^{\circ} 37'$ .

**TCHEHARSHEBEH**, a town of Asiatic Turkey, in Natolia; 30 miles S.E. of Alah Shehr.

**TCHKENAGUR**, a town of Asiatic Turkey, in Caramania; 21 miles S. of Kirfhehr.

**TCHÉ-KIANG**, a province of China, bounded on the north and north-west by Kiang-nan, on the east by the sea, on the south by Fo-kien, and on the south-west by Kiang-fi; about 200 miles in length from north to south, and from 120 to 180 broad. This province, which was formerly the residence of some of the emperors, is one of the most considerable in the empire, on account of its maritime situation, extent, riches, and the number of its inhabitants. The air is pure and healthful; the plains are watered by a number of rivers and canals, kept in good order; and the springs and lakes, with which it abounds, contribute greatly to its fertility. The natives are mild and lively, and very polite to strangers; but they are said to be extremely superstitious. A prodigious quantity of silk-worms is bred in this province; whole plains may be seen covered with dwarf mulberry-trees, which are purposely checked in their growth: they are planted and pruned almost in the same manner as vines. Long experience has taught the Chinese, that the leaves of the smallest trees procure the best silks. The principal branch, therefore, of the trade of this province, consists in silk-stuffs; those in which gold and silver are intermixed are the most beautiful, and most esteemed in the empire. With regard to their common pieces, an immense quantity is sent to every part of China, to Japan, the Philippines, and to Europe;

Europe; and, notwithstanding this exportation, so much is left, that a complete suit of silk may be bought here as cheap as one of the coarsest woollen-cloth in France. Excellent hams are brought from this province, and those small gold fish with which ponds are commonly stocked. The tallow-tree grows here, and a species of mushrooms, which are transported to every province of the empire. In Tchekiang there are reckoned to be 11 cities of the first class, 72 of the third, and 18 fortresses, which in Europe would be accounted large cities. (Grozier's China, vol. i. p. 64.) According to Sir George Staunton, the number of inhabitants amounts to 21 millions, and the province includes 39,150 square miles, or 25,056,000 acres. See CHINA.

TCHÉLAO, a town of Persia, in the province of Chorasan, or Khorassan: near it is a narrow defile in a mountain, called, by the orientals, Hell, from the difficulty of the passage.

TCHÉLBOSCH, a river of Russia, which joins the Bifuga, and runs with it into the sea of Azof; 40 miles S.W. of Eiskoi.

TCHÉLEH-DAGHI, a mountain of Natolia, N.E. of Boli.

TCHÉLGA, a town of Abyssinia; 20 miles N.W. of Gondar. N. lat.  $12^{\circ} 44'$ . E. long.  $37^{\circ} 18'$ .

TCHÉLIABINSK, a town of Russia, in the government of Upha; 188 miles E. of Upha. N. lat.  $54^{\circ} 50'$ . E. long.  $62^{\circ} 4'$ .

TCHÉLMINAR, or TCHILMINAR. See CHILMINAR.

TCHÉMURTAESKOI, in *Geography*, a fortress of Russia, in the government of Irkutsk; 60 miles S.W. of Selenginsk.

TCHÉN, a town of Corea; 13 miles N.N.E. of Ping-hai.—Also, a city of China, of the second rank, in Ho-nan; 416 miles S.S.W. of Peking. N. lat.  $34^{\circ} 46'$ . E. long.  $110^{\circ} 36'$ .—Also, a city of China, of the second rank, in the island of Hai-nan; 57 miles S.W. of Kiong-tcheou. N. lat.  $19^{\circ} 32'$ . E. long.  $108^{\circ} 49'$ .

TCHÉN-AN, a town of Corea; 35 miles S.S.E. of Hetün.

TCHÉNBAR, a town of Russia, in the government of Penza; 80 miles W.S.W. of Penza. N. lat.  $52^{\circ} 52'$ . E. long.  $43^{\circ} 30'$ .

TCHÉNDEI, a river of Russia, which runs into the Yana, near its mouth.

TCHÉNE, a town of Egypt, on the right bank of the Nile; 18 miles N. of Enfeneh.

TCHÉNG-TCHANG, a town of Corea; 30 miles S.S.E. of Haimen.

TCHÉNG-TE, an island in the Eastern sea, near the south coast of Corea; about 10 miles long, and 6 broad. N. lat.  $34^{\circ} 20'$ . E. long.  $128^{\circ} 37'$ .

TCHÉN-HAI, a town of Corea; 30 miles S. of Tsin-tcheou.

TCHÉNJEE. See HÆMUS.

TCHÉOU-CHAN, or CHU-SAN, an island in the Chinese sea, near the west coast of China, belonging to the province of Tchekiang, about 24 miles long, and from 4 to 10 broad.

TCHÉPAGIRSKOI, a town of Russia, on the Podkamonskaia Tunguska. N. lat.  $61^{\circ} 20'$ . E. long.  $96^{\circ} 44'$ .

TCHÉPETKINA, a river of Russia, which runs into the Kolima, 88 miles N. of Verchnei Kovimskoi. N. lat.  $67^{\circ} 35'$ . E. long.  $148^{\circ} 14'$ .

TCHÉR, a river of Russia, which runs into the Don, near Tcherekovskaia, in the country of the Cossacks.

TCHÉRDAKLI, a town of Russia, in the government of Ekaterinav; 32 miles N. of Mariupol.

TCHÉREDOVA, a town of Russia, in the government of Tobolsk, on the Irtisch; 16 miles N. of Tara.

TCHÉREMISSES and TCHÉUWASSES, tribes of people occupying the vicinity of the Volga, in the government of Regen. These people use the horse in their sacrifices, and chiefly white ones, especially in their great annual solemnities in autumn, of which none can partake, unless he has first bathed and put on a clean shirt.

TCHÉREMSCHAN, a river of Russia, which runs into the Volga, near Singiliev, in the government of Simbirsk.

TCHÉREPOVETZ, a town of Russia, in the government of Novgorod, on the Sula; 188 miles E.N.E. of Novgorod. N. lat.  $59^{\circ} 40'$ . E. long.  $37^{\circ} 34'$ .

TCHÉRGONA, *Valley of*, a sequestered beautiful valley of the Crimea, inhabited by the richest Tartars, who, from their vicinity to Aktiar, find a ready market for the produce of their lands; carrying thither honey, wax, fruit, and corn. This valley is described as the retreat of health and joy; the pipe and tabor sounding merrily among mountains, thick set with groves, which clothe them on every side. The performers consist of parties of Tzigankies, or gipsies, who, as mendicant artificers, musicians, and astrologers, are very common all over the south of Russia. They have also a wind-instrument resembling a haut-boy, made of the wood of cherry-tree, and they carry with them the large Tartar drum, characteristic of the Cimbric in the time of Strabo. These gipsies are much encouraged by the Tartars, who allow them to encamp among their villages and to exercise their various occupations. Many of them are rich, possessing fine horses and plenty of other cattle; but rich or poor, their mode of life is the same.

TCHÉRIKOV, a town of Russia, in the government of Mogilev, on the Soz; 80 miles S. of Mogilev. N. lat.  $52^{\circ} 36'$ . E. long.  $30^{\circ} 54'$ .

TCHÉRKASK, a town of Russia, in the country of the Cossacks, on the Don. The appearance of the town, viewed from the river, affords a most novel spectacle. Although not so grand as Venice, it somewhat resembles that city. The entrance to it is by broad canals, intersecting it in all parts. On each side, wooden houses, built on piles, appear to float upon the water; to these the inhabitants pass in boats, or by narrow bridges only two planks wide, with posts and rails, forming a causeway to every quarter of the town.

The town of Tcherkask is divided into eleven stanitzas, and contains 15,000 inhabitants, occupying about 3000 houses, and allowing, upon an average, five persons to each house. Here are seven churches, four built of stone and three of wood. One of these churches is appropriated to the Mahometan worship of the Tartars. The first erected in this place was founded by Peter the Great, and in this they keep what they call their regalia, applying the term to republican, rather than to regal, ensigns of distinction. Another church is built in the Grecian taste, with fourteen Corinthian columns, covered entirely with burnished gold. Almost all the other public edifices are constructed of wood. Here are six prisons, four for males and two for females; and the prisoners are allowed to go about begging in their chains. The shops are very numerous, kept chiefly by Greeks, and containing the produce of Turkey, as pearls, cloth, shawls, tobacco, fruit, &c. Here are two public baths, and each stanitza has its respective tavern. The inhabitants, according to Dr. Clarke in his Travels (vol. i.), are cleanly in their appearance, polished in their manners, well instructed, hospitable, generous, and disinterested, humane to the poor, good husbands, good brothers, good  
wives,

wives, good mothers, virtuous daughters, valiant and dutiful sons. "A Cossack," he says, "placed by the side of a Russian, what a contrast!" 32 miles E.N.E. of Azof.

**TCHERKASSES**, or **TSCHERKASSIANS**, a tribe of people, who inhabit that part of Caucasus which is called the Great and Little Kabardia, the islands of the lower Kuban, and the southern bank of that river. (See **CIRCASSIA**.) These people are famous for their horses, which are about the size of the Kalmuck horse, ill-made, without elegance or proportion, and for the most part ewe-necked, but of such strong and hardy natures, as to be able to run five or six hundred English miles in three days.

**TCHERKESH**, a town of Asiatic Turkey, in Natalia; 45 miles W.S.W. of Castamena.

**TCHERKIN**, a town of Abyssinia; 36 miles N. of Gondar. N. lat.  $13^{\circ} 15'$ . E. long.  $37^{\circ} 40'$ .

**TCHERMAEVSKOI**, a town of Russia, in the government of Tobolsk; 32 miles E.N.E. of Turinsk.

**TCHERNAIA**, a river of Russia, which runs into the Anadir, 100 miles below Anadirskoi.

**TCHERNAIAGRIADA**, a fortress of Russia, on the Volga; 32 miles N.N.W. of Astrachan.

**TCHERNIGOV**, a town of Russia, and capital of a government, on the Desna; 344 miles S.S.W. of Moscow. N. lat.  $51^{\circ} 24'$ . E. long.  $31^{\circ} 14'$ .

**TCHERNIGOVSKOE**, a government of Russia, bounded on the N. by Mogilevskoe, on the N.W. by Novgorod Sieverskoe, on the E. by Charkovskoe, on the S. by Kievskoe, and on the W. by Poland: about 180 miles long and 40 broad. N. lat.  $49^{\circ} 50'$  to  $51^{\circ} 5'$ . E. long.  $31^{\circ}$  to  $35^{\circ}$ .

**TCHERNIKEH**, a town of Asiatic Turkey, in the government of Sivas, at the union of the Tosanlu and Jekil-Ermak; anciently a city of Pontus, and called Eupatoria, from Mithridates, surnamed Eupator; 24 miles N. of Amasia. N. lat.  $40^{\circ} 26'$ . E. long.  $36^{\circ} 38'$ .

**TCHERNITZ**. See **CZERNITZ**.

**TCHERNOIYAR**, a town of Russia, in the government of Saratov, defended by a ditch and chevaux-de-frieze, with some cannon; 200 miles N.W. of Astrachan. N. lat.  $47^{\circ} 54'$ . E. long.  $46^{\circ} 4'$ .

**TCHERNOLUTZKAIA**, a town of Russia, in the government of Tobolsk; 20 miles W. of Omsk.

**TCHERNOMORSKI**, or *Cossacks of the Black Sea*, a tribe of Cossacks, whose territory is separated by the river *Ae* or *Yea*, from that of the Grecian or Malo-Russian inhabitants, whose number does not exceed 700 persons, and the boundary of whose district is formed by the river *Ae* towards the S. and by the sea of Azof to the N. The Tchernomorski are a brave but rude and warlike people, and hospitable to strangers. Their original appellation was Zaporogtzi or Zaporagians, denoting their former situation "beyond the cataracts" of the Dnieper. From the banks of this river they were removed by the late empress Catharine to those of the Kuban, in order to repel the incursions of the Circassians and Tartars from the Turkish frontier. In consequence of the service they rendered to Russia in Catharine's last war with Turkey, the empress, by an ukase of the 2d of June, 1792, ceded to them the peninsula of Taman, and all the countries between the Kuban and the sea of Azof, as far as the rivers *Ae* and *Laba*; an extent of territory comprehending upwards of 1000 square miles. They had also a constitution allotted to them in all respects similar to that of the Don Cossacks, and received the appellation of "Cossacks of the Black sea." They were also allowed the privilege of choosing an Ataman; but their numbers have been considerably diminished. They could once

bring into the field an army of 40,000 effective cavalry; but at present, their number of troops does not exceed 15,000. They now occupy the whole country from the *Ae* to the Kuban, and from the Black sea to the frontier of the Don Cossacks. (See **COSSACKS**.) The Tchernomorski do not resemble the Cossacks of the Don in habits, disposition, or any other characteristic quality. The latter wear the true uniform; the former wear any habit according to their caprice. The Don Cossack is mild, affable, and polite; the Black-sea Cossack is blunt and even rude, from the boldness and martial hardihood of his manners. If he is poor, he appears clad like a primeval shepherd, or the wildest mountaineer; at the same time having his head bald, except one long braided lock from the crown, placed behind the right ear. This lock distinguishes the Tchernomorski Cossack from the Cossack of the Don, as well as from every other tribe of Cossacks in the Russian empire. If the Euxine Cossack is rich, he is very lavish in the costliness of his dress, which consists of embroidered velvet, and the richest silks and cloths of every variety of colour. The Tchernomorski are more cheerful and noisy than the Don Cossacks; turbulent in their mirth; vehement in conversation; somewhat querulous; and if not engaged in dispute, they are generally laughing or singing. Both these Cossacks hold one another in low estimation. The metropolis of the Tchernomorski Cossacks is "Ekaterinedara," or "Catherine's Gift." It has no resemblance to a town; but is rather a grove, or forest of oaks, in which a number of straggling cottages, widely separated, are concealed, not only from general observation, but from the view of each other. The country is covered with tumuli, which are very ancient, and appear by their remains to have been sepulchres. The government is wholly exercised by the Ataman and his officers, who wear theatrical and splendid habits. Their breasts are covered with chains of gold and gold-lace; their sabre is Turkish; their boots of red or yellow-coloured leather; their cap of black velvet, ornamented with lace and silver chains, or fine black Tartarian wool, taken from lambs in an embryo state. They bind their waist with silken sashes, sustaining pistols of the most costly workmanship. A small whip, with a short leather thong, is attached to their little finger. The lower extremity of their lance is supported by the right foot; and from the powder-flask, pendent in front, are suspended silver coins, and other trinkets. The Circassians and Tchernomorski carry on trade by a peculiar kind of barter. The exchange of corn, honey, mats, wood, and arms, for the salt of the Cossacks, is transacted without contract; the wares of the Circassians being placed on the ground where they find the salt ready stationed for barter. The Tchernomorski who are employed in guarding their cattle in the steppes, amounting to many thousands, from the depredations of the Circassians, pass the night upon the bare ground; and in order to protect themselves from the mosquitoes, which are both numerous and troublesome, creep into a kind of sack, sufficient only for the covering of a single person; beneath this they lie upon the thistles and other wild plants of the steppes. In order to avoid the excessive irritation and painful swelling occasioned by the stings of these ferocious insects, they light a number of fires to drive them from the cattle during the night; but their thirst of blood is so insatiate, that swarms will attack a person attempting to shelter himself even in the midst of smoke. See Clarke's Travels, vol. ii. 8vo.

**TCHERNORIEGENSKAIA**, a fortress of Russia, in the government of Upha, on the Ural; 12 miles W. of Orenburg.—Also, a fortress of Russia, in the government of Simbirsk, on the river Sak; 80 miles S.E. of Simbirsk.

**TCHERPLINSKOI**, a fortress of Russia, in the government of Upha, on the Ural; 124 miles E. of Orenburg.

**TCHERTCHI**, a town of Thibet; 20 miles S.W. of Harachar.

**TCHERTOVSKA**, a town of Russia, in the government of Irkutsk; 32 miles S.W. of Kirensk.

**TCHERVLENA**, a fortress of Russia, in the government of Caucasus, on the Malka; 64 miles E. of Ekaterinograd.

**TCHESKAIA**, a gulf or bay in the Frozen ocean, on the N. coast of Russia. N. lat.  $66^{\circ} 50'$  to  $77^{\circ} 40'$ . E. long.  $45^{\circ}$  to  $47^{\circ}$ .

**TCHESUCHINSKOI**, a fortress of Russia, on the borders of China; 104 miles S.W. of Nertchinsk.

**TCHE-TAN**, a river of China, which runs into the Tom, 12 miles W. of Yeou.

**TCHE-TCHEOU HOTUN**, a town of Chinese Tartary, in the country of Hami; 983 miles E. of Peking. N. lat.  $40^{\circ} 29'$ . E. long.  $94^{\circ} 21'$ .

**TCHETIRDAGH**, a mountain of the Crimea, the *Trapezius* of Strabo, the height of which Pallas states to be about 1200 feet, and Dr. Clarke says, that it does not exceed 1300 feet; though the rapidity of its rise from the coast about Alufsa makes its elevation appear to be much greater. Almost the whole of the Crimea may be seen from its summit in clear weather. The higher parts of this mountain exhibit a mass of lime-stone, very compact and of a grey colour. Its ancient name, *Trapezius*, was probably derived from the table-form of its summit. The lower district is covered by groves impenetrable to the rays of the sun.

**TCHEUISKOI**, a town of Russia, in the government of Tobolsk, on the Oby; 48 miles N.N.E. of Kolivan.

**TCH EVTZA**, a river of Russia, which runs into the Viatka, near Slobodkoi, in the government of Viatka.

**TCHIATAM**, a town of Thibet; 510 miles E. of Lassa. N. lat.  $28^{\circ} 3'$ . E. long.  $99^{\circ} 20'$ .

**TCHICOU**, a town of Corea; 18 miles S.S.E. of Long Kouang.

**TCHICSE**, a town of Thibet; 12 miles E. of Latac.

**TCHICTAMA**, a town of Thibet; 15 miles N.E. of Pi-tchan.

**TCHIEIN**, a town of Russia, near the straits which separate the continent of Asia from America. N. lat.  $65^{\circ} 40'$ . E. long.  $188^{\circ} 24'$ .

**TCHIGLING**, a river of North America, which runs into the Frozen sea, opposite to the island of Chichitli.

**TCHIKIRI**, a river of Chinese Tartary, which runs into the Amur, 15 miles N. of Saghalién Oula Hotun.

**TCHILINSKOI**, a town of Russia, in the government of Irkutsk, on the Ingoda; 60 miles E. of Doroninsk.

**TCHILLDIR MOUNTAINS**, a name which is given to a very high ridge, formed by some branches of mount Caucasus, which taking an opposite direction of those known by the name of the "Mountains of Ceraunii," pass towards the S. and S.W., cross Ahgaz and Mingrelia, and encircle the Euxine to the E. and S.E. These unite in the above-named high ridge on the northern frontier of Immeretia, and again open into the Turkish province of Akisna. Here they assume the appellation of Tchilldir, and would appear to separate into three branches, the most northern of which follows in a S.E. line the banks of the Cyrus, and ultimately produces an immense range, which running parallel with the Caspian, separates Irak from Ghilan and Mazanderan, and to the N. of Meshed is lost in the deserts of

Khorassan. In the neighbourhood of Sultanea and Cazween this range receives the name of Khai Caucasan, and in the vicinity of Tehraun it is called Elbourz. The middle ridge of the Tchilldir mountains, under the denomination of the Mossian hills, traverses the province of Georgia, and bounds on the N. the delightful plain of Erivan. It then enters the Russian districts of the Karabaug and Karadaug, and gradually sinks into the plains of Mogan. The last and most southern branch of the Tchilldir mountains, bending to the S. and E., passes the town of Kars, and forms a junction with mount Taurus. Kinneir's Mem. of the Persian Empire.

**TCHINDAT TURUKUEVSKOI**, a fort of Russia, in the government of Irkutsk; 72 miles S. of Nertchinsk.

**TCHINDAT *Turukuevska***, a fortress of Russia, in the government of Irkutsk; 80 miles S.W. of Nertchinsk.

**TCHINEH**, a town of Asiatic Turkey, in Natolia; 15 miles W.N.W. of Moglah.

**TCHING**, a city of China, of the second rank, in Honan; 382 miles S. of Peking. N. lat.  $33^{\circ} 49'$ . E. long.  $114^{\circ} 38'$ .—Also, a city of China, of the second rank, in Honan; 340 miles S.S.W. of Peking. N. lat.  $34^{\circ} 50'$ . E. long.  $113^{\circ} 29'$ .

**TCHI-NGAM**, a city of China, of the second rank, in Se-tchuen; 780 miles S.W. of Peking. N. lat.  $28^{\circ} 32'$ . E. long.  $107^{\circ} 4'$ .

**TCHING-CANG**, a city of China, of the second rank, in Yun-nan; 1302 miles S.W. of Peking. N. lat.  $24^{\circ} 12'$ . E. long.  $99^{\circ} 16'$ .

**TCHING-CHAN**, a town of Corea; 30 miles S.S.E. of Ou-tchuen.

**TCHING-HE**, a town of Corea; 30 miles N.N.E. of Kang-tcheou.

**TCHING-HIANG**, a city of China, of the first rank, in Se-tchuen; 910 miles S.W. of Peking. N. lat.  $27^{\circ} 18'$ . E. long.  $104^{\circ} 26'$ .

**TCHING-KIANG**, a city of China, of the first rank, in Kiang-nan, on the south side of the river Yang-tse. This is not one of the largest cities of the province, for it is not above a league in circumference, and has authority over only three cities of the third class, but it is one of the most considerable for its situation and commerce; it is the key of the empire towards the sea, and is also a fortress, where there is also a strong garrison; the walls are above 30 feet in height in several places. The streets of the city and suburbs are paved with marble; 470 miles S.S.E. of Peking. N. lat.  $32^{\circ} 14'$ . E. long.  $118^{\circ} 55'$ .—Also, a city of China, of the first rank, in Yun-nan; 1082 miles S.S.W. of Peking. N. lat.  $24^{\circ} 44'$ . E. long.  $102^{\circ} 40'$ .

**TCHING-NING**, a city of China, of the second rank, in Koei-tcheou; 1017 miles S.S.W. of Peking. N. lat.  $26^{\circ} 3'$ . E. long.  $105^{\circ} 23'$ .

**TCHING-TCHEOU**, a city of China, of the first rank, in Hou-quang. This city is situated on an angle made by two rivers; the country is watered by a great number of brooks, which make the vallies exceeding fruitful; it is very full of mountains, which yield plenty of quick-silver, lapis lazuli, and green-stones for painting. There are also mines of silver and gold. The people who inhabit the mountains are not so polite as the rest of the Chinese; on the contrary, their rude and savage manners make them to be looked upon as barbarians. The district of this city contains one of the second order, and nine of the third; 765 miles S.S.W. of Peking. N. lat.  $28^{\circ} 23'$ . E. long.  $109^{\circ} 40'$ .—Also, a city of the province of Kiang-nan, situated near the canal through which all barks going from

Sou-tcheou to Kiang must pass. It is celebrated on account of its trade, and water which gives tea a pleasant taste: dependent on it are five cities of the third class, in which a particular kind of earthen-ware is manufactured, highly valued by the Chinese, and preferred to the most elegant porcelain.

**TCHING-TEOU**, a town of Corea; 30 miles S.S.W. of Kang-tcheou.

**TCHING-TING**, a city of China, of the first rank, in Pe-tche-li. Tching-ting is a large city, about four miles in circumference. Its jurisdiction is very extensive, and comprehends 32 towas; five of which are of the second, and 27 of the third class. Northward from it lie several mountains, where the Chinese say many simples and curious plants are to be found; on these mountains there are also several monuments or temples, erected in honour of deceased heroes; among which is one consecrated to the memory of the first emperor of the dynasty of Han; 137 miles S.S.W. of Peking. N. lat.  $39^{\circ} 9'$ . E. long.  $114^{\circ} 20'$ .

**TCHING-TOU**, a city of China, of the first rank, in Se-tchuen. This was formerly the residence of the emperors, and one of the largest and most beautiful cities in China; but in 1646, it was almost entirely destroyed, during the civil wars which preceded the last invasion by the Tartars. Its temples, bridges, and the ruins of ancient palaces, are objects of admiration to strangers; neither its commerce, nor the manners of its inhabitants, have any thing to distinguish it from other cities, nor its situation, which is, however, exceedingly pleasant. It has under its jurisdiction six cities of the second class and 25 of the third; 810 miles S.W. of Peking. N. lat.  $30^{\circ} 40'$ . E. long.  $103^{\circ} 44'$ .

**TCHIN-HOA**, a town of Corea; 50 miles E.N.E. of King-ki-tao.

**TCHINKITANY BAY**, a bay on the W. coast of North America, called by the Spaniards *Baya de Guadalupe*.

**TCHIN-NAN**, a city of China, of the second rank, in Yun-nan; 1187 miles S.W. of Peking. N. lat.  $25^{\circ} 16'$ . E. long.  $101^{\circ} 4'$ .

**TCHIN-NGAN**, a city of China, of the first rank, in Quang-fi; 1150 miles S.S.W. of Peking. N. lat.  $23^{\circ} 21'$ . E. long.  $106^{\circ}$ .

**TCHIN-YUEN**, a city of China, of the second rank, in Quang-fi; 1145 miles S.S.W. of Peking. N. lat.  $23^{\circ} 14'$ . E. long.  $106^{\circ} 49'$ .

**TCHIRAKI**, a town of Chinese Tartary, in the country of the Kalkas. N. lat.  $48^{\circ} 36'$ . E. long.  $115^{\circ} 16'$ .

**TCHIRINKOUTAN**, one of the small Kurile islands. N. lat.  $49^{\circ} 20'$ . E. long.  $153^{\circ} 4'$ .

**TCHIRNOOI**, one of the small Kurile islands. N. lat.  $47^{\circ} 8'$ . E. long.  $151^{\circ} 50'$ .

**TCHIRON**. See SHIRON.

**TCHISEGI DAGHI**, a mountain of Asiatic Turkey, in the government of Sivas, near Divriki.

**TCHISTAY**, a town of Bohemia, in the circle of Boleflau; 4 miles N.W. of Jung Buntzel.

**TCHISTIAKOVA**, a town of Russia, in the government of Perm; 36 miles N. of Perm.

**TCHISTOKOLSK**, a town of Russia, in the government of Kazan; 36 miles S.E. of Kazan. N. lat.  $50^{\circ} 16'$ . E. long.  $49^{\circ} 54'$ .

**TCHI-TCHEOU**, a city of China, of the first rank, in Kiang-nan; 570 miles S. of Peking. N. lat.  $30^{\circ} 45'$ . E. long.  $117^{\circ}$ .

**TCHI-TCHOUAN**, a town of Thibet; 20 miles N. of Chao-ma-ing Hotun.

**TCHIUNA**, a river of Russia, which rises six miles from Bratskoi, in the government of Kolivan, lat.  $56^{\circ}$  long.  $101^{\circ}$ , and runs into the Tunguska, 56 miles S.E. of Enifeisk. N. lat.  $57^{\circ} 54'$ . E. long.  $93^{\circ} 34'$ .

**TCHIURAC**, a river of Natolia, which runs into the Meinder near Teheharshbeh.

**TCHI-YUEN**, a town of Corea; 15 miles S.E. of Tsin-tcheou.—Also, a city of China, of the first rank, in Koei-tcheou; 1000 miles S.S.W. of Peking. N. lat.  $27^{\circ} 1'$ . E. long.  $107^{\circ} 51'$ .

**TCHO**, a city of China, of the second rank, in Chan-fi, on the river Fuen; 298 miles S.W. of Peking. N. lat.  $36^{\circ} 36'$ . E. long.  $111^{\circ} 23'$ .

**TCHOCO**, a town of Thibet; 18 miles E. of Hara-char Hotun.

**TCHOHA KIAMEN**, a post of Chinese Tartary; 45 miles S.W. of Kara.

**TCHOI**. See PALCATE *Nor*.

**TCHOKA**. See SAGHALIEN.

**TCHOL**, a river of Chinese Tartary, which rises in lat.  $48^{\circ} 20'$ , long.  $120^{\circ} 34'$ , and runs into the Noup, N. lat.  $46^{\circ} 28'$ . E. long.  $123^{\circ} 31'$ .

**TCHOL Hotun**, a town of Chinese Tartary, on a river of the same name; 500 miles N.N.E. of Peking. N. lat.  $46^{\circ} 41'$ . E. long.  $123^{\circ} 35'$ .

**TCHOL-ABADI**, a town of Asiatic Turkey, in Caramania; 32 miles S.W. of Askhehr.

**TCHOM-COU-CHO**, a town of Chinese Tartary; 25 miles S.W. of Ning-yuen.

**TCHOM-YUEN**, a town of Chinese Tartary; 15 miles N. of Geho.

**TCHONG**, a town of Corea; 68 miles from Kin-naitchan.—Also, a city of China, of the second rank, in Quang-fi; 1175 miles W. of Peking. N. lat.  $22^{\circ} 26'$ . E. long.  $107^{\circ} 4'$ .

**TCHONG-HOTOC**, a town of Thibet; 90 miles S.S.W. of Horatoubé.

**TCHONG-KIANG-CHE**, a town on the W. coast of Formosa. N. lat.  $24^{\circ} 40'$ . E. long.  $138^{\circ} 2'$ .

**TCHONG-KING**, a city of China, of the first rank, in Se-tchuen. This is one of the most commercial cities of the province. It is in a great measure indebted for its trade to its situation at the confluence of two remarkable rivers; one of which, called *Hin-cha-kiang*, or *Golden-sand*, receives in its course all the streams from the mountains, which rise on the neighbouring confines of Tartary. The other is *Ta-kiang*, which has its source beyond the boundaries of China, and is commonly called *Tang-tse-kiang*. Tchong-king is built upon a mountain, and rises in the form of an amphitheatre: the air round it is wholesome and temperate. This city is celebrated for its fish, and a particular kind of trunks, made with canes, interwoven in the manner of basket-work. It has in its district three cities of the second class, and eleven of the third; 750 miles S.W. of Peking. N. lat.  $29^{\circ} 42'$ . E. long.  $106^{\circ} 19'$ .

**TCHONG-KOUE**, or the *Middle Kingdom*, the name which the Chinese give to this empire; the western Moguls call it *Catay*; the Manchew Tartars, *Nican-courou*; the Japanese, *Thau*; and the people of Cochinchina and Siam, *Cin*, from which last appellation that of China is probably derived.

**TCHONTORI**, a town of Thibet; 175 miles S.E. of Hami. N. lat.  $40^{\circ} 24'$ . E. long.  $96^{\circ} 34'$ .

**TCHORRO-TOHON-KIAMEN**, a post of Chinese Tartary; 23 miles N. of Odoli.

**TCHORS**, a town of Persia, in the province of Adirbeitzan, inhabited by Curds, subject to Persia; 78 miles W.N.W. of Tauris.

**TCHOSCHO**, a small river of Russia, which runs into the Tcheskaia gulf, 40 miles N.N.E. of Mezen.

**TCHOUCCDOU**, a town of Chinese Tartary; 20 miles N.N.W. of Petouné-Hotun.

**TCHOUCHAN**, a town of Corea; 38 miles S. of King-ki-tao.

**TCHOUCHLOMA**, a town of Russia, in the government of Kostrom; 76 miles N.E. of Kostrom. N. lat.  $58^{\circ} 35'$ . E. long.  $42^{\circ} 40'$ .

**TCHOUCTEY-KIAMEN**, a post of Chinese Tartary; 10 miles N.E. of Tchol.

**TCHOUUDSONG**, a town of Thibet, on the borders of China; 340 miles S.E. of Laffa. N. lat.  $27^{\circ} 22'$ . E. long.  $96^{\circ} 50'$ .

**TCHOUKIA-POURAN**, a town of Thibet; 69 miles S.S.E. of Laffa.

**TCHOU-KIONG**, or YUNG, a city of China, of the first rank, in Yun-nan; 1187 miles S.W. of Peking. N. lat.  $25^{\circ} 6'$ . E. long.  $101^{\circ} 20'$ .

**TCHOULGUE-HOTUN**, a town of Chinese Tartary; 745 miles E.N.E. of Peking. N. lat.  $44^{\circ} 1'$ . E. long.  $131^{\circ} 47'$ .—Also, a town of Chinese Tartary; 840 miles E.N.E. of Peking. N. lat.  $44^{\circ} 48'$ . E. long.  $133^{\circ} 49'$ .

**TCHOU MOU**, a town of Thibet; 63 miles E.S.E. of Laffa.

**TCHOU MOURTI**, a town of Thibet, near the Ganges; 225 miles E.S.E. of Latac.

**TCHOURHATAI**, a town of Chinese Tartary. N. lat.  $43^{\circ} 4'$ . E. long.  $119^{\circ} 45'$ .

**TCHOUSOR**, a town of Thibet; 36 miles S.W. of Laffa.

**TCHOU-TAN**, a river of China, which runs into the Yuen, near Hong-kiang-fe.

**TCHOU-TCHAN-TCHE**, a town of the island of Formosa. N. lat.  $24^{\circ} 48'$ . E. long.  $120^{\circ} 21'$ .

**TCHUDSKOI**, a lake of Russia, between the governments of Petersburg and Riga; about 64 miles in length, and from 8 to 24 in breadth. N. lat.  $58^{\circ}$  to  $59^{\circ} 10'$ . E. long.  $27^{\circ}$  to  $27^{\circ} 28'$ . See PEIPIUS.

**TCHUGUEV**, a town of Russia, in the government of Charkov; 12 miles E. of Charkov. N. lat.  $49^{\circ} 58'$ . E. long.  $36^{\circ} 14'$ .

**TCHUKOTCH**, a river of Russia, which runs into the Icy sea, N. lat.  $71^{\circ} 30'$ . E. long.  $155^{\circ} 14'$ .

**TCHUKOTSKIJA**, the most eastern province of Russia, in the government of Irkutsk, extending from N.W. to S.E., about 740 miles in length, and nearly 520 from N. to S. N. lat.  $63^{\circ}$  to  $73^{\circ} 20'$ . E. long.  $157^{\circ}$  to  $159^{\circ}$ .

**TCHUKOTSKOI**, a cape of the N.E. extremity of Siberia, at the entrance of the straits which divide the Pacific ocean from the Frozen sea, and the continent of America from Asia. N. lat.  $66^{\circ} 15'$ . E. long.  $199^{\circ} 14'$ .

**TCHULIM**, a river of Russia, formed by the union of several rivers, which runs into the Oby, near Moltchanovka.

**TCHUMARA-STANITZ**, a town of Russia, in the government of Irkutsk, on the Lena. N. lat.  $61^{\circ} 12'$ . E. long.  $125^{\circ} 14'$ .

**TCHUMISCH**, a river of Russia, which runs into the Oby, 6 miles S.S.E. of Kolivan.

**TCHURKINO**, a lake of Russia, 320 miles N.N.W. of Zashiverk. N. lat.  $72^{\circ} 30'$ . E. long.  $134^{\circ} 4'$ .

**TCHUSOVAIA**, a town of Russia, in the government of Perm; 28 miles N. of Perm.—Also, a town of Russia,

in the government of Perm, at the union of the Tchusovaia and the Kama; 16 miles N. of Perm.—Also, a river of Russia, which joins the Silva, and runs into the Kama, about 12 miles above Perm.

**TCHUSOVOI**, a town of Russia, in the government of Perm; 40 miles N.E. of Perm.

**TCHU-TCHEOU**, a city of China, of the first rank, in Tche-kiang; 730 miles S.S.E. of Peking. N. lat.  $28^{\circ} 36'$ . E. long.  $139^{\circ} 33'$ .

**TCI-NAN**, or TSI-NAN, a city of China, of the first rank, in the province of Chan-tong, situated south of the river T'ing-ho, or Tsi: this city is large and populous, and is much respected by the Chinese, on account of its having been formerly the residence of a long series of kings, whose tombs, rising on the neighbouring mountains, afford a beautiful prospect. Tci-nan has under its jurisdiction four cities of the second class, and 26 of the third; 235 miles S. of Peking. N. lat.  $36^{\circ} 46'$ . E. long.  $116^{\circ} 46'$ .

**TCIN-CHOU**, a lake of China, about 37 miles in circumference; 25 miles N.N.E. of Tfin-tcheou.

**TCING**, a city of China, of the second rank, in Pe-tche-li; 130 miles S.S.W. of Peking. N. lat.  $38^{\circ} 8'$ . E. long.  $114^{\circ} 6'$ .

**TCI-NGIN**, a city of China, of the second rank, in Chang-tong; 275 miles S. of Peking. N. lat.  $35^{\circ} 34'$ . E. long.  $116^{\circ} 24'$ .

**TCIN-TCHEOU**, or Tsin-tcheou, a city of China, of the first rank, in Chang-tong. The principal branch of its commerce is fish, which are caught in such abundance, that, we are assured, the profit arising from their skins only is very considerable. It has in its district one city of the second class, and 13 of the third; 230 miles S.S.E. of Peking. N. lat.  $36^{\circ} 46'$ . E. long.  $118^{\circ} 20'$ .

**TCITCICAR-HOTUN**, a town of Chinese Tartary. This is the usual residence of a Tartarian general, and capital of a district. This city was built to guard the frontiers of the Chinese empire from the Russians. The city is fortified by close palisades, and a wall constructed of earth. The space inclosed by the former contains the tribunals and the house of the Tartar general; that which is between the palisades and the earthen wall is occupied by the soldiers of the Tartar garrison, merchants, and tradesmen, most of whom are Chinese invited hither by hopes of gain, or condemned to exile, and whose houses are only of earth, forming pretty large streets. The jurisdiction of the general who commands here extends over the new cities of Merguen and Saghalien-oula (city of the Black river): the latter being, on account of its situation, the most populous, the richest, and the most important. It is situated on the southern bank of the river Saghalien, commands a plain in which several villages have been built, and secures to the Mantchew Tartars the possession of extensive deserts covered with woods, in which a great number of fables are found.

The district to which this city belongs is the most northerly of the three departments of Eastern Chinese Tartary. It is occupied by different Tartar tribes, the principal of which are the Mantchews, Solons, and the Tagouris, the ancient inhabitants of the country. The two latter tribes submitted to the Mantchews, and implored their assistance against the Russians or Muscovites, who, with armed barks, passing from the Saghalien-oula into the Songari-oula, infested all the rivers which flow into them, and made themselves formidable to the Tartar nations who inhabited their banks. The Russians would soon have become masters of the valuable forests in which the fables are found, if the fort of Yafca, which they built on the river Saghalien, had been suffered to remain; but, by the treaty of peace concluded in 1689,

between the Russians and Chinese, it was agreed that it should be demolished, that no cause of umbrage or complaint might be left to the Tartar hunters.

The Tagouris, who appear to be the oldest inhabitants of the country, are tall, strong of body, and accustomed to labour; they build themselves houses, sow corn, and cultivate their lands, although they have always been surrounded by Tartars who live under tents, and are entirely ignorant of agriculture.

The Solon Tartars are still more robust, braver, and of greater ingenuity; they are almost all hunters; their women mount on horseback, handle the bow and the javelin, and follow in the chase stags and other wild animals. It is generally about the beginning of October that these Tartars depart to hunt fables, clad in a short close garment of wolf's skin: they cover their heads with a cap made of the same, and carry their bows suspended at their backs.

They take along with them several horses loaded with sacks of millet, and their long cloaks made of foxes' or tygers' skins, which they wrap round them to defend themselves from the cold, especially during the night. Their dogs are trained to this kind of hunting; they are accustomed to climb the steepest rocks, and know all the stratagems of the fables.

The fables' skins of this country are highly valued. Some of the rivers that run into the Saghalien-oula furnish pearls; 335 miles N.E. of Peking. N. lat. 47° 25'. E. long. 123° 30'.

TE, a city of China, of the second rank, in Chan-tong, on the grand canal; 150 miles S. of Peking. N. lat. 37° 35'. E. long. 115° 50'.

TEA-Tree, in Botany. See THEA.

TEA, in common language, denotes the leaves of the tea-tree, as they are imported into this country, and the infusion of them in boiling water. The term is more extensively applied to any other infusion of ordinary roots or herbs.

Dr. Lettson, in his botanical description of the tea-plant, thinks it most probable, that there is only one species, and that the difference between the green and bohea teas depends on the nature of the soil, culture, age, and the manner of drying the leaves. He adds, that it has even been observed, that a green tea-tree, planted in the bohea tea country, will produce bohea, and on the contrary; and that on his examining several hundred flowers, brought both from the bohea and green tea countries, their botanical characters have always appeared uniform. We are principally indebted to Kämpfer, Le Comte, and Du Halde, for an authentic history of the culture of this exotic shrub, and the manner of preparing or curing its leaves.

The particulars of greatest importance that have been recited, have lately been judiciously collected, and the subject further illustrated by additional observations by Dr. Lettson.

The tea-tree loves to grow in vallies, at the foot of mountains, and upon the banks of rivers, where it enjoys a southern exposure to the sun; though it endures considerable variations of heat and cold, as it flourishes in the northern climate of Peking, as well as about Canton; and it is observed that the degree of cold at Peking is as severe in winter as it is some of the northern parts of Europe. However, the best tea grows in a mild temperate climate, the country about Nanking producing better tea than either Peking or Canton, betwixt which places it is situated.

The root resembles that of the peach-tree; the leaves are green, longish at the point, and pretty narrow, an inch and half long, and jagged all round. The flower is much like that of the wild rose, but smaller. The fruit is of different

forms, sometimes round, sometimes long, sometimes triangular, and of the ordinary size of a bean, containing two or three seeds, of a mouse-colour, including each a kernel. These are the seeds by which the plant is propagated: a number from six to twelve or fifteen being promiscuously put into one hole, four or five inches deep, at certain distances from each other. The seeds vegetate without any other care, though the more industrious annually remove the weeds, and manure the land. The leaves which succeed are not fit to be plucked before the third year's growth, at which period they are plentiful, and in their prime.

In about seven years the shrub rises to a man's height, and as it then bears few leaves, and grows slowly, it is cut down to the stem, which occasions an exuberance of fresh shoots and leaves the succeeding summer; some, indeed, defer cutting them till they are of ten years' growth. In Japan, the tea-tree is cultivated round the borders of the fields, without regard to the soil; but as the Chinese export considerable quantities of tea, they plant whole fields with it. The leaves are not collected from the cultivated plant till it is three years old; and after growing seven or ten years, it is cut down, in order that the numerous young shoots may afford a greater supply of leaves.

The best time to gather the leaves of tea is while they are yet small, young, and juicy; and the different periods in which they are gathered are particularly described by Kämpfer. The first gathering of the tea-leaves, according to this author, commences about the latter end of February, when the leaves are young and unexpanded. The second collection is made about the beginning of April, and the third in June. The first collection, which consists only of the fine tender leaves, is most esteemed, and is called Imperial tea. The second is called Tootsjaa, or Chinese tea, because it is infused and drunk after the Chinese manner. The last, which is the coarsest and cheapest, is chiefly consumed by the lower class of people. Besides the three kinds of tea here noticed, it may be observed, that by garbling or sorting these, the varieties of tea become still further multiplied. The leaves are plucked carefully one by one, and notwithstanding the seeming tediousness of this operation, the labourers are able to gather from four to ten or fifteen pounds each in one day. The tea-trees that yield often the finest leaves, grow on the steep declivities of hills, where it is dangerous, and in some cases impracticable to collect them. The Chinese are said to vanquish this difficulty by a singular contrivance. The large monkeys which inhabit these cliffs are irritated, and in revenge they break off the branches, and throw them down, so that the leaves are thus obtained. The leaves should be dried as soon as possible after they are gathered.

The buildings, or drying-houses, that are erected for curing of tea, contain from five to ten or twenty small furnaces, about three feet high, each having at the top a large flat iron pan. There is also a long low table covered with mats, on which the leaves are laid, and rolled by workmen, who sit round it: the iron pan being heated to a certain degree by a little fire made in the furnace underneath, a few pounds of the fresh-gathered leaves are put upon the pan; the fresh and juicy leaves crack when they touch the pan, and it is the business of the operator to shift them as quick as possible with his bare hands, till they become too hot to be easily endured. At this instant he takes off the leaves with a kind of shovel resembling a fan, and pours them on the mats before the rollers, who, taking small quantities at a time, roll them in the palm of their hands in one direction, while others are fanning them, that they may cool the more speedily, and retain their curl the longer. This process is repeated two or

three times, or oftener, before the tea is put into the stores, in order that all the moisture of the leaves may be thoroughly dissipated, and their curl more completely preserved. On every repetition the pan is less heated, and the operation performed more slowly and cautiously. The tea is then separated into the different kinds, and deposited in the store for domestic use or exportation.

The Chinese know nothing of *imperial tea*, *flower of tea*, and many other names, which in Europe serve to distinguish the goodness and the price of this fashionable commodity; but, beside the common tea, they distinguish two other kinds, *viz.* the *voui* and *founlo*, which are reserved for people of the first quality, and those who are sick. We have two principal kinds of tea in Europe; *viz.*

TEA, *Green*, which is the common tea of the Chinese, &c. F. le Comte calls it *bing* tea, and says it is gathered from the plant in April. It is held very digestive, and a little astringent; it gives a palish-green tincture to water, and its leaves are much twisted.

TEA, *Bohea*, which is the *voui* tea, or *bou tcha* of the Chinese. F. le Comte makes this only differ from the green tea, by its being gathered a month before it, *viz.* in March, while in the bud; and hence the smallness of the leaves, as well as the depth of the tincture it gives to water. Others take it for the tea of some particular province; the soil being found to make an alteration in the properties of the tea, as much as the season of gathering it. It is all bought at Nankin, and thence brought into Europe, where it is now much in vogue.

As to the differences in colour and flavour peculiar to these two kinds, and to their varieties, Dr. Lettson thinks that there is reason to suspect that they are, in some measure, adventitious, or produced by art. He has been informed by intelligent persons, who have resided some time at Canton, that the tea about that city affords very little smell while growing. The same is observed of the tea-plants now in England, and also of the dried specimens from China. We are not, however, as he observes, to conclude from hence, that art alone conveys to tea, when cured, the smell peculiar to each kind; for our vegetable grasses, for instance, have little or no smell till they are dried and made into hay.

As to the opinion, that the green tea owes its verdure to an efflorescence acquired from the plates of copper on which it is supposed to be cured or dried, he shews that there is no foundation for this suspicion. The infusions of the finest imperial and bloom teas undergo no change on the affusion of a volatile alkali, which would detect the minutest portion of copper contained in them, by turning the liquors blue.

The fine green colour of these teas, with as little reason, hath been attributed to green copperas; as this metallic salt would, on its being dissolved in water, immediately act on the astringent matter of the leaves, and convert the infusion into ink, as happens when a chalybeate water has been employed in the making of tea.

On the whole, Dr. Lettson thinks it not improbable, that some green dye prepared from vegetable substances, is employed in the colouring of the leaves of the green teas. And Neumann suspects, that the brown colour and the flavour of the bohea sorts are introduced by art. Both the green and bohea teas have an agreeable smell, and a lightly bitterish subastringent taste: with solution of chalybeate vitriol, they strike an inky blackness. They give out their smell and taste both to watery and spirituous menstrua; to water, the green sorts communicate their own green tincture, and the bohea, their brown; but to rectified spirit, they both impart a fine deep green. The extracts, obtained

by gently drawing off the menstrua from the filtered tinctures, are very considerably astringent, and not a little ungrateful; but the spirituous most so.

Savary also speaks of a sort of *red* tea, or *Tartar* tea, called *Honan tcha*, which tinges the water of a pale red, and which is said to be extremely digestive: by means of it the Tartars are said to be able to feed on raw flesh. Its taste is earthy, and much the least agreeable of them all: but this is scarcely known in England.

Tea is to be chosen of the briskest smell, and as whole as possible: and the greatest care is to be taken that it have not been exposed to the air to pall and evaporate.

The drink, tea, is made in China, and throughout the greatest part of the East, after the same manner as in Europe; *viz.* by infusing the leaves in boiling water, and drinking the infusion hot. Indeed, among us, it is usual to temper its bitterness with sugar, but the Orientals use it without the addition of sugar or milk.

However, the Japanese are said to prepare their liquor in a somewhat different way, *viz.* by pulverizing the leaves, stirring the powder in hot water, and drinking it as we do coffee.

From the account given by Du Halde, this method is not peculiar to the Japanese, but is also used in some provinces of China.

The common people, who have a coarser tea, boil it for some time in water, and make use of the liquor for common drink. Early in the morning, the kettle, filled with water, is regularly hung over the fire for this purpose, and the tea is either put into the kettle enclosed in a bag, or by means of a basket of proper size pressed to the bottom of the vessel, that there may be no hindrance in drawing off the water.

The Bantsjaa tea only is used in this manner, whose virtues being more fixed, would not be so fully extracted by infusion.

The Chinese are always taking tea, especially at meals: it is the chief treat with which they regale their friends. The most moderate take it at least thrice a day; others ten times, or more; and yet it is computed, the consumption of tea among the English and Dutch is as great, in proportion, as among the Orientals.

With regard to the commercial history of tea, we may observe that it was first introduced into Europe by the Dutch East India Company, very early in the 17th century, and that a quantity of it was brought over from Holland by lord Arlington and lord Ossory, about the year 1666, at which time it was sold for 60s. a pound. But it appears, that before this time, drinking of tea, even in public coffee-houses in this country, was not uncommon; for in 1660, a duty of 8*s.* per gallon was laid on the liquor made and sold in all coffee-houses.

The present consumption of it is immense, both among the rich and poor. Dr. Lettson tells us, that he has been informed, that at least three millions of pounds are allowed for the annual home consumption, not including the incredible quantity smuggled into the kingdom; and that the East India Company have generally in their warehouses a supply for three years.

In the appendix to sir George Staunton's Account of Lord Macartney's Embassy to China, we have several statements relating to the tea-trade with China. The average of teas exported from China to Europe in foreign ships, for nine years, *viz.* from March 1772 to 1780, the average of the number of ships being twelve, was 13,198,201 lbs.; in English ships, at the average of nine, 5,639,939 lbs.: the total average of ships is twenty-one, and of exported tea 18,838,140 lbs.

18,838,140 lbs. The annual consumption of tea by foreigners in Europe is estimated at 5,500,000 lbs.; and the consumption of Great Britain and her dependencies is at least 13,338,140 lbs., which, at 700,000 lbs. *per* ship, would employ thirty-eight large ships constantly in the China trade, instead of eighteen ships, as above, most of which were small, one fleet going out when another is coming home.

The above is exclusive of private trade teas, brought legally and illegally into Europe. It is said, upon the authority of confidential information, that the English ships have often smuggled from 1000 to 3000 chests of tea each; and also that the foreign captains bring a large quantity of tea, which they either smuggle at sea, or throw into the sea, the punishment being severe. The loss to the public on 1000 chests of hyson tea smuggled, is above 20,000*l*.

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As to the properties of tea, they are strangely controverted: the Eastern nations are at least as much possessed with an idea of their extraordinary virtues as the Europeans; but it is, perhaps, because imagination bears as great a sway there as here. The reason why the gout and stone are unknown in China, is ascribed to the use of this plant.

Tea is extolled as the greatest of all medicines: moderately and properly taken, it acts as a gentle astringent and corroborative: it strengthens the stomach and bowels, and is good against nauſeas, indigestions, and diarrhœas. It acts also as a diuretic and diaphoretic. The immoderate use of it, however, has been very prejudicial to many, who have been thereby thrown into the diabetes.

And also in Europe, infusions of tea-leaves have been extravagantly condemned by some, and commended by others. From the contradictory opinions, even of medical writers, on this subject, the natural inference seems to be, that they possess neither noxious nor beneficial powers, in any very considerable degree. They seem, when moderately used, to be for the most part innocent; in some cases they seem to be salutary; in some they are apparently prejudicial. They dilute thick juices, and quench thirst more apparently, and pass off by the natural excretories more freely, than more watery fluids: they refresh the spirits in heaviness and sleepiness, and seem to counteract the operation of inebriating liquors.

From their manifest astringency, they have been supposed to strengthen and brace up the solids, but this effect experience does not countenance; as it is in disorders, and in constitutions in which corroborants are more serviceable, that the immoderate use of tea is peculiarly hurtful; in cold indolent habits, cachexies, chlorosis, dropies, and debilities of the nervous system. Lewis's *Mat. Med.*

Dr. Lettſom has particularly inquired into the medical qualities and effects of tea; and having observed that infusions of bohea and green tea contribute to preserve sweet some small pieces of beef immerſed in them, he infers that they possess an antiseptic power, when applied to the dead

animal fibre, and from their striking a purple colour with salt of iron, he deduces their astringent quality.

From other experiments he concludes, that the activity of tea chiefly resides in its fragrant and volatile parts; and that if the use of it be beneficial or injurious to any particular constitution, it becomes so principally by means of this odorous fragrant principle. He apprehends that it is the safest course to use the infusion of the more ordinary kinds of this plant, which abound less with this fragrant principle. Or the tea may be boiled a few minutes, in order to dissipate this volatile part, which stands charged as the cause of those nervous affections that are said to be produced, or aggravated, by the use of this liquor. By this process may likewise be extracted more copiously the more fixed, bitter, and stomatic parts of this vegetable.

Dr. Lettſom, who seems to be thoroughly persuaded of the occasionally noxious effects of this volatile principle, in the finer teas especially, recommends this last mentioned mode of making tea, or the substitution of the extract instead of the leaves; by the use of which the nervous relaxing effects, which follow the drinking of tea in the usual manner, would be in great measure avoided. This extract has been imported hither from China, in the form of small cakes, not exceeding a quarter of an ounce each in weight, ten grains of which might suffice one person for breakfast; but it might easily be made here by simple decoction and evaporation, by those who experience the noxious qualities of the volatile principles of this plant.

It may be farther observed, that the effect of drinking large quantities of any warm aqueous liquor would be to enter speedily into the course of circulation, and pass off as speedily by urine or perspiration, or the increase of some of the secretions.

Its effects on the solid parts of the constitution would be relaxing, and thereby enfeebling.

If this warm aqueous fluid were taken in considerable quantities, its effects would be proportionable, and still greater if it were substituted instead of nutriment. The infusion of tea, however, has these two peculiarities. It is not only possessed of a sedative quality, but also of a considerable astringency; by which the relaxing power, ascribed to a mere aqueous fluid, is in some measure corrected on this account. It is, perhaps, less injurious than many other infusions of herbs, which, besides a very slight aromatic flavour, have very little, if any, stypticity, to prevent their relaxing debilitating effects.

So far, therefore, tea, if not too fine, if not drank too hot, nor in too great quantities, is perhaps preferable to any other known vegetable infusion. And if we take into consideration, likewise, its known enlivening energy, our attachment to it will appear to be owing to its superiority in taste and effects to most other vegetables. See Dr. Lettſom's *Natural History of the Tea-tree, with Observations on the Medical Qualities of Tea, and Effects of Tea-drinking*, 4to. 1772.

Tea may be considered as a very powerful aphrodisiac; and accordingly, a physician of considerable eminence in his profession, imputes the amazing population of China, amongst other causes, to the general use of it. Percival's *Ess.* p. 63.

We shall close this part of the article with a transcript of its medicinal powers, as they are stated by Dr. Cullen (*Mat. Med.* vol. ii.) "With respect to its qualities as a medicine, that is, its power of changing the state of the human body, we might suppose it ascertained by the experience of its daily use; but from the universality of this use in very different conditions of the plant, and in every possible condition of

the persons employing it, the conclusions drawn from its effects must be very precarious and ambiguous, and we must attempt by other means to ascertain its qualities with more certainty.

“ To this purpose it appears, from the accurate Dr. Smith’s experiments ‘ De Actione Musculari,’ No. 36, that an infusion of green tea has the effect of destroying the sensibility of the nerves, and the irritability of the muscles; and from the experiments of Dr. Lettson, it appears that green tea gives out in distillation an odorous water, which is powerfully narcotic.

That the recent plant contains such an odorous narcotic power, we might presume from the necessity which the Chinese find of drying it with much heat before it can be brought into use; and that, even after such preparation, they must abstain from the use of it for a year or more, that is, till its volatile parts are still farther dissipated: and it is said, that unless they use this precaution, the tea in a more recent state manifestly shews strong narcotic powers. Even in this country, the more odorous teas often shew their sedative powers in weakening the nerves of the stomach, and indeed of the whole system.

“ From these considerations we conclude very firmly, that tea is to be considered as a narcotic and sedative substance; and that it is especially such in its most odorous state, and therefore less in the bohea than in the green tea, and the most so in the more odorous, or what are called the finer kinds of the latter.

“ Its effects, however, seem to be very different in different persons; and hence the different, and even contradictory accounts that are reported of these effects. But if we consider the difference of constitution, which occasions some difference of the operation of the same medicine in different persons, and of which we have a remarkable proof in the operation of opium, we shall not be surpris’d at the different operations of tea.

“ If to this we add the fallacy arising from the condition of the tea employed, which is often so inert as to have no effects at all; and if we still add to this the power of habit, which can destroy the powers of the most powerful substances, we shall not allow the various and even contradictory reports of its effects to alter our judgment, with respect to its ordinary and more general qualities in affecting the human body.

“ From the experiments above-mentioned, and from the observations which I have made in the course of fifty years, in all sorts of persons, I am convinced that the qualities of tea are narcotic and sedative.

“ It has been often alleged, that some of the bad effects imputed to tea are truly owing to the large quantity of warm water which commonly accompanies it, and it is possible that some bad effects may arise from this cause: but from attentive observation I can assert, that wherever any considerable effects appear, they are in nine of every ten persons entirely from the qualities of the tea; and that any like effects of warm water do not appear in one of a hundred who take in this very largely.

“ But while we thus endeavour to establish the poisonous nature of tea, we do not at the same time deny that it may sometimes shew useful qualities. It is very possible, that in certain persons, taken in moderate quantity, it may, like other narcotics in a moderate dose, prove exhilarating, or, like these, have some effect in taking off irritability, or in quieting some irregularities of the nervous system.

“ As its bad effects have been often imputed to the warm water that accompanies it, so we have no doubt that some of its good effects may also be ascribed to the same cause,

and particularly its being so often grateful after a full meal.”

By 9 Geo. II. c. 35, if a vessel, coming from foreign parts, and having 6 lbs. or more of tea on board, shall be found at anchor, or within two leagues of the shore, &c. all such tea, with chest and package, shall be forfeited. The importer of any coffee, tea, or cocoa-nuts, shall within thirty days enter the said tea, &c. and warehouse it. (10 Geo. c. 10. 5 Geo. III. c. 43.) That which is landed without entry and warehousing shall be forfeited. But this shall not extend to any coffee or tea imported by the East India Company. The coffee and tea intended for home consumption shall be entered and the duty paid. (10 G. c. 10.) A permit shall be given for the removal of tea from any warehouse, whether it be bohea, congou, fouchong, or pekoe tea; and such tea shall in the permit be specified under the denomination of *black* tea; and if the tea be neither bohea, congou, fouchong, nor pekoe tea, then such tea shall be specified under the denomination of *green* tea. 43 Geo. III. c. 129.

By 13 Geo. III. c. 44. no licence shall be granted to the East India Company to export tea, unless there remain in the warehouses a quantity not less than ten millions of pounds weight.

No tea is allowed to be imported, except from the place of its growth, on pain of forfeiture. (11 Geo. c. 30.) And by 24 Geo. III. c. 38. all the duties upon tea imported, sold, or used in this kingdom, shall cease from September 15, 1784; at which period the East India Company is discharged from the payment of duties on tea in their warehouses; and afterwards there shall be paid a duty of 12l. 10s. *per cent.* computed upon the gross prices for all tea delivered by the Company to the purchasers, which duty shall be drawn back on exportation to any place where the drawback is already allowed. The Company is required to make four sales in the year, and to sell such quantity as shall be sufficient to supply the demand, provided an advance of 1d. *per lb.* be bid upon the prices at which the teas shall be put up; and at the four first sales after passing the act, these prices shall not exceed the following rates; *viz.* for bohea tea, 1s. 7d. *per lb.*; congou tea, 2s. 5d. *per lb.*; for fouchong tea, 3s. 3d. *per lb.*; for singlo tea, 3s. 4d. *per lb.*; and for hyson tea, 4s. 11d. *per lb.*: and afterwards the whole price at which the teas are put up, shall not exceed the prime cost, with the freight and charges of importation, lawful interest from the time of the arrival of such tea in Great Britain, and the common premium of insurance. In lieu of the duties on tea, this act substitutes an additional duty on windows. See COMMUTATION *Act*.

By this same act, the inland duty upon cocoa-nuts and coffee shall cease from September 15, 1784, and the following additional duties be paid; *viz.* for every pound of cocoa-nuts, the produce of British America, 6d. and the produce of any other place, 1s. 6d.; and for every pound of coffee, the produce of British America, 6d. and the produce of any other place, 2s. 6d.; and these duties are subject to an additional impost of 5 *per cent.* and 5 *per cent.* thereon imposed by 19 Geo. III. c. 25. and 22 Geo. III. c. 66.

If coffee or tea are intended to be taken out for exportation, they shall be delivered out on security that they shall be exported, and not reloaded. 13 Geo. c. 10.

No drawback shall be allowed on tea exported, except to Ireland, &c. where the whole duty on exportation shall be allowed. 18 Geo. II. c. 26. 17 Geo. III. c. 27. 43 Geo. III. c. 69.

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“ Its effects, however, seem to be very different in different persons; and hence the different, and even contradictory accounts that are reported of these effects. But if we consider the difference of constitution, which occasions some difference of the operation of the same medicine in different persons, and of which we have a remarkable proof in the operation of opium, we shall not be surpris’d at the different operations of tea.

“ If to this we add the fallacy arising from the condition of the tea employed, which is often so inert as to have no effects at all; and if we still add to this the power of habit, which can destroy the powers of the most powerful substances, we shall not allow the various and even contradictory reports of its effects to alter our judgment, with respect to its ordinary and more general qualities in affecting the human body.

“ From the experiments above-mentioned, and from the observations which I have made in the course of fifty years, in all sorts of persons, I am convinced that the qualities of tea are narcotic and sedative.

“ It has been often alleged, that some of the bad effects imputed to tea are truly owing to the large quantity of warm water which commonly accompanies it, and it is possible that some bad effects may arise from this cause: but from attentive observation I can assert, that wherever any considerable effects appear, they are in nine of every ten persons entirely from the qualities of the tea; and that any like effects of warm water do not appear in one of a hundred who take in this very largely.

“ But while we thus endeavour to establish the poisonous nature of tea, we do not at the same time deny that it may sometimes shew useful qualities. It is very possible, that in certain persons, taken in moderate quantity, it may, like other narcotics in a moderate dose, prove exhilarating, or, like these, have some effect in taking off irritability, or in quieting some irregularities of the nervous system.

“ As its bad effects have been often imputed to the warm water that accompanies it, so we have no doubt that some of its good effects may also be ascribed to the same cause,

and particularly its being so often grateful after a full meal.”

By 9 Geo. II. c. 35, if a vessel, coming from foreign parts, and having 6 lbs. or more of tea on board, shall be found at anchor, or within two leagues of the shore, &c. all such tea, with chest and package, shall be forfeited. The importer of any coffee, tea, or cocoa-nuts, shall within thirty days enter the said tea, &c. and warehouse it. (10 Geo. c. 10. 5 Geo. III. c. 43.) That which is landed without entry and warehousing shall be forfeited. But this shall not extend to any coffee or tea imported by the East India Company. The coffee and tea intended for home consumption shall be entered and the duty paid. (10 G. c. 10.) A permit shall be given for the removal of tea from any warehouse, whether it be bohea, congou, fouchong, or pekoe tea; and such tea shall in the permit be specified under the denomination of *black* tea; and if the tea be neither bohea, congou, fouchong, nor pekoe tea, then such tea shall be specified under the denomination of *green* tea. 43 Geo. III. c. 129.

By 13 Geo. III. c. 44. no licence shall be granted to the East India Company to export tea, unless there remain in the warehouses a quantity not less than ten millions of pounds weight.

No tea is allowed to be imported, except from the place of its growth, on pain of forfeiture. (11 Geo. c. 30.) And by 24 Geo. III. c. 38. all the duties upon tea imported, sold, or used in this kingdom, shall cease from September 15, 1784; at which period the East India Company is discharged from the payment of duties on tea in their warehouses; and afterwards there shall be paid a duty of 12*l.* 10*s.* *per cent.* computed upon the gross prices for all tea delivered by the Company to the purchasers, which duty shall be drawn back on exportation to any place where the drawback is already allowed. The Company is required to make four sales in the year, and to sell such quantity as shall be sufficient to supply the demand, provided an advance of 1*d.* *per lb.* be bid upon the prices at which the teas shall be put up; and at the four first sales after passing the act, these prices shall not exceed the following rates; *viz.* for bohea tea, 1*s.* 7*d.* *per lb.*; congou tea, 2*s.* 5*d.* *per lb.*; for fouchong tea, 3*s.* 3*d.* *per lb.*; for singlo tea, 3*s.* 4*d.* *per lb.*; and for hyson tea, 4*s.* 11*d.* *per lb.*: and afterwards the whole price at which the teas are put up, shall not exceed the prime cost, with the freight and charges of importation, lawful interest from the time of the arrival of such tea in Great Britain, and the common premium of insurance. In lieu of the duties on tea, this act substitutes an additional duty on windows. See COMMUTATION *Act*.

By this same act, the inland duty upon cocoa-nuts and coffee shall cease from September 15, 1784, and the following additional duties be paid; *viz.* for every pound of cocoa-nuts, the produce of British America, 6*d.* and the produce of any other place, 1*s.* 6*d.*; and for every pound of coffee, the produce of British America, 6*d.* and the produce of any other place, 2*s.* 6*d.*; and these duties are subject to an additional impost of 5 *per cent.* and 5 *per cent.* thereon imposed by 19 Geo. III. c. 25. and 22 Geo. III. c. 66.

If coffee or tea are intended to be taken out for exportation, they shall be delivered out on security that they shall be exported, and not reloaded. 13 Geo. c. 10.

No drawback shall be allowed on tea exported, except to Ireland, &c. where the whole duty on exportation shall be allowed. 18 Geo. II. c. 26. 17 Geo. III. c. 27. 43 Geo. III. c. 69.

Every person having in his custody more than six pounds weight of tea, is a dealer; and selling without a licence, to

be had for 12*d.*, shall forfeit 5*l.* a month. (11 Geo. c. 30.) If any person offer any tea to sale without a permit, or a pedlar with one, the person to whom it is offered may seize the same, &c. 9 Geo. II. c. 35. See COFFEE.

Every person dealing in tea, &c. shall cause to be painted or written over the door of his shop, the words *dealer in coffee, tea, cocoa-nuts, or chocolate*, on pain of 20*l.* (19 Geo. III. c. 69.) And any dealer buying of any person who has not this inscription, incurs forfeiture of 100*l.*, and any other person 10*l.* By 20 Geo. III. c. 35. no person shall trade in coffee, tea, or chocolate, without a licence, at the price (by 43 Geo. III. c. 69.) of 5*s.* 6*d.*, under penalty of 20*l.* The adulteration of tea is subject to a penalty of 100*l.* besides the forfeiture of the same, and for every pound of dyed leaves of tea, 5*l.* 11 Geo. c. 30. 17 Geo. III. c. 29.

At the East India Company's sale of teas, an account shall be taken of the buyers and prices, and the best bidder shall within three days deposit with the Company, or their clerks, 40*s.* for every tub or chest of tea, on pain of six times the value, and such sale shall be void, and the same shall in 14 days after be put up again. (18 Geo. II. c. 26.) And by 13 Geo. III. c. 44. the deposit for every tub and chest of bohea tea shall be 4*l.* By 13 Geo. III. c. 44. tea may be exported. No tea shall be received, with or without a permit, within the limits of the bills of mortality; and no tea, exceeding 20*lbs.* weight, shall at one time be received, with or without a permit, out of the said limits, on pain of forfeiture. (21 Geo. III. c. 55. 22 Geo. III. c. 68. 23 Geo. III. c. 70.) All tea seized and condemned shall be sold to the best bidder. (24 Geo. III. sess. 2. c. 47.) Tea carried in the night, with or without a permit, except in certain circumstances, shall be forfeited, and may be seized by any officer for the inland duties as tea. 21 Geo. III. c. 55.

TEA, *Buckthorn*. See RHAMNUS.

TEA, *German*. See SPEEDWELL.

TEA, *Mexico*, *Chenopodium ambrosioides* of Linnæus, is a species of chenopodium, which, as well as the Jerusalem oak, or chenopodium botrys, are natives of the southern parts of Europe, and sown annually with us in gardens. Infusions of the leaves and flowery heads of both these plants, which are not unpalatable, drank as tea, are said to be of service in humoral asthma and coughs, and other disorders of the breast; they are supposed to be antispasmodic and antihysteric. Lewis's Mat. Med.

TEA, *New Jersey*. See CEANOTHUS.

TEA, *New Zealand*. See PHILADELPHUS.

TEA, *Oswego*. See MONARDA.

TEA, *Paraguay, or South Sea*. See PARAGUAY.

TEA, *West Indian*. See SIDA.

TEA Soup, in *Rural Economy*, that which is prepared from the tea, liquid, or infusion of some sort of vegetable substance or other, such as hay, cut straw, or haulm, &c. by thickening it a little with some sort of mealy material, or mashed potatoes, or other such roots, after being boiled or leamed.

TEA, in *Geography*, a river of England, in the county of Buckingham, which runs into the Ouse near Stony Stratford.

TEAHOWRAY. See PORTLAND Island.

TEAK, or TEEK, a species of timber that occurs frequently in various parts of the East Indies, and which is applied to a variety of domestic and nautical purposes. Extensive forests of these trees border on the banks of the Godavery within the mountains, and supply abundance of ship-timber for the adjacent ports. The teak forests, from which the marine yard at Bombay is furnished with that ex-

cellent species of ship-timber, lie along the western side of the Gaut mountains, and other contiguous ridges of hills, as the N. and N.E. of Bassen; the numerous rivulets that descend from them affording water-carriage for the timber. Major Rennell reproaches the unpardonable negligence with which Europeans are chargeable for delaying to build ships of war for the service of the Indian seas. They might be freighted home, without the ceremony of regular equipment, as to masts, sails, and furniture; which might be calculated to answer the purpose of the home-passage at the best season; and crews could be provided in India. Teak ships of 40 years old and upwards are not uncommon in the Indian seas, while an European ship is ruined there in five years. The teak is called the Indian oak. See TECTONA.

TEAKI, in *Geography*, an island in the Mediterranean; twenty miles long, and four broad. This island was anciently called "Ithaca," and is memorable in Grecian history for being the kingdom of Ulysses; some Europeans call it "Val de Compare." N. lat. 38° 47'. E. long. 21° 40'.

TEAL, QUERQUEDULA, in *Ornithology*, the *Anas crecca* of Linnæus, the smallest of all the duck kind. Its beak is black, and its head, and upper part of its neck, of a reddish-brown; but there runs on each side of the head a green streak from behind the eyes quite to the back part, and between these is a black spot under the eyes; there is a white line which separates the reddish colour from the green. The lower part of the neck, the shoulders, and the sides, are very beautifully variegated with black and white streaks; the breast and belly are of a dusky greyish-white; the first beautifully spotted with black; the vent black; the tail sharp-pointed and dusky; the coverts of the wings brown; the greater quill-feathers dusky; the exterior webs of the lesser marked with a glossy green spot, above which is another of black, and the tips white; the irides whitish, and the legs dusky. The female is of a brownish ash colour, spotted with black, and has a green spot on the wing, like the male. Ray and Pennant. See DUCK.

TEAL, *Crested, Querquedula cristata*, a name given by Bellonius and some others to a species of duck, remarkable for a tuft of feathers an inch and half long, hanging down from the back part of the head, and thence called the *tufted* duck; but more known among authors by the name of *capo negro*. See DUCK.

TEAL, *Summer, Anas circia* of Linnæus, is apprehended by Mr. Pennant to be no other than the female of our teal, though Linnæus has described it as a distinct species. See DUCK.

Summer teal is also a name given in some places to the garganey.

TEAM, THEAM, or *Tbame*, in our *Ancient Customs*, signifies a royalty granted by the king's charter to a lord of a manor, for the having, restraining, and judging bondmen, neifs, and villeins, with their children, goods, and chattels, in his court.

TEAM, in *Agriculture*, the number of horses, oxen, or other animals which are drawing together at once in the same plough, cart, waggon, or other carriage. There is a great variety of different sorts of teams employed in field, road, and other sorts of labour, which is carried on by means of domestic animals; and it is of very great importance to ascertain which of them is of the greatest advantage, and the cheapest in the different uses and intentions.

In all sorts of farming work, in the field as well as on the road, the heavier kinds of strong horses, and those of the close, short, compact, punch breeds, have hitherto, for the most part, been employed for the purpose of team labour; and for

## TEAM.

for the dray, and every sort of similar heavy work, where a slow, steady, strong draught is required, they are also unquestionably the most proper and suitable, as long experience has fully proved. But a considerable alteration has lately taken place in the kinds which are made use of as teams for carrying on the lighter sorts of road-work, whether by means of carriages or other vehicles.

It has been found that the stouter sort of horses, possessing a little blood, are by much the best adapted to this kind of labour of any, being much more active and expeditious, as well as more durable, and less liable to fatigue and to become tired out on the road. On this account they form the teams for most sorts of coach and other carriage labour, and in many instances for various heavier descriptions of it; and it is not improbable but that, in some cases, they might be substituted as teams for farming work with great propriety and advantage, in consequence of their quicker pace, and having what is commonly called more bottom.

Among farmers it has long been a disputed point, whether horses or oxen form the most economical and advantageous team for the purpose of the cultivator in performing his work, and it remains still undecided, though many intelligent agriculturalists now incline to the side of horse-teams, except in particular circumstances and situations. And a late writer has remarked, that the circumstances in which the latter have been chiefly supposed to be more advantageous than the former, are in their being kept at less expence, and their not declining in value. But that these, when examined, are perhaps not so decisive of their superiority, as they may at first sight appear; for where the work of the farm is done by the younger sort of horses, which is perhaps the best method, the decline in value cannot be of any material consequence, while the superiority in point of the dispatch of work is very great. And in regard to the keep, as oxen cannot perform their labour well in continuance without oats, or some other sustenance of a similar kind, it would seem not improbable but that young horses may pay nearly as well as oxen, and be kept with little difference in the expence. Indeed the common opinion, that oxen are superior to horses in the tillage of heavy lands, does not at all appear to be well founded, especially when drawn in *yokes* and *bowes*, as the poaching must be greater than by horses working at length. But when in harness, they may, from their greater steadiness, be preferable; of course, under different management, they are capable of being employed in both ways. But in all such cases, as where quick motion is of more importance than the steady drawing of heavy weights, the horse is much superior to the ox, as well as in carting, where great speed is required in the unloaded state, and wherever the roads or lands are rough, sharp, and stony, as oxen cannot be shod so well as horses to stand such roads. And in harrowing with light harrows, where a jumping irregular motion is necessary, it has been shewn in the *Annals of Agriculture*, that horses are the most proper, and to be constantly preferred. In short, that teams of the ox-kind may be made use of with benefit in many cases in business about the farm, but they are incompatible with all sorts of distant work, and especially on the road, and in stony situations.

It has been remarked, in a late *Calendar of husbandry*, that there are two cases in which oxen are certainly more beneficial than horses: first, when a farmer lives in a district where there is a breed of cattle well adapted to work; and, secondly, when his farm is so large, that he can buy in a lot of cattle annually, at a small expence *per head*, and feel no inconvenience in turning out such beasts from the teams

to fatten as do not work well. In both these cases, the writer has little doubt of the superiority of oxen to horses. But in countries that do not possess a breed of cattle well adapted for work in the state of oxen; and on small farms, whence fairs must be attended at the distance of a hundred miles to purchase a few, and consequently at a great expence *per head*, and possibly without land for fattening any, the benefit will be very questionable.

It has been suggested by the writers of the *Agricultural Survey of the West Riding of Yorkshire*, that from the circumstances of ox-teams being almost universally given up in those places where they were formerly in repute, a suspicion arises, that working them is not attended with profit.

In regard to the national advantages to be derived from a change from horses to oxen, there does not appear to be any great benefit, as it has been shewn by Mr. Pitt in an excellent paper in the fifth volume of *Communications to the Board of Agriculture*, that as those used in agriculture are in a great measure a nursery for those wanted for other purposes; the extent of such change can take place no farther than about the work of 100,000 horses.

To ascertain what general effect such a change might produce in increasing food for mankind, as what he calls the higher kept farm-horses are generally, or at least a part of them in preparation for sale, for the road, or harness; he must suppose the deduction made, from what he has called moderately kept farm-horses; now supported at four acres and a half *per head*; then the deduction of

	Acres.
100,000 of those would save the landed produce of - - - - -	450,000
And the deduction of young stock, in the same proportion, one-ninth of the whole, would save one-ninth of 250,000 acres, to preserve even numbers, suppose - - - - -	30,000
In all saved - - - - -	480,000

The idea in all the midland counties is, it is observed, that two oxen will be required to do the work of each horse; 200,000 working oxen will therefore be wanted instead of the horses thus deducted. To give the oxen a fair chance in this calculation, he will suppose them fit to work at three years old, and the workers to be of the ages of three, four, five, and six respectively, 50,000 of each; the same number coming one, two, and three years old, will be wanted for succession stock; and 50,000 annually fatted off; the land necessary for their support may be nearly as follows:

	Acres.
Keep of 50,000 steers, of the ages of coming one, two, and three years old respectively, 150,000 acres in all, at one acre each <i>per head per annum</i> - - - - -	150,000
200,000 working oxen, of full three, four, five, and six years old, 50,000 of each, at two and a half acres <i>per head per annum</i> - - - - -	500,000
Less land cannot, it is believed, be possibly allowed to keep them in working condition; they must have hay and sometimes corn when closely worked, 50,000 fattening, at three acres <i>per head</i> - - - - -	150,000
Land necessary for the oxen - - - - -	800,000
Deduct for the horses - - - - -	480,000
Difference - - - - -	320,000

These 320,000 acres of land will produce 50,000 fat oxen, or 32 acres will produce five fat oxen; suppose them 270lbs. *per quarter* each, or 5400lbs. of beef from 32 acres; this is 168 $\frac{3}{4}$ lbs. of beef *per acre per annum*: but a dairy will, it is said, produce more, and a flock of sheep well managed quite as much human food *per acre*. Little advantage, therefore, would, it is said, be derived from this change of substituting oxen for horses in agriculture, unless the use of horses on the road, and for purposes of pleasure, luxury, pomp, amusement, trade, mining, manufactures, commerce, and war, could be abolished or lessened.

Accordingly, Mr. Malthus thinks the advantages of luxury, when it falls short of actual vice, are certainly great: it cannot be denied, but it contributes to the comforts, enjoyments, and consequent happiness of a nation; but if carried too far, it will completely defeat its own purpose; the surest way is to stop short of the mark.

In the clear, full, and excellent account of the state of agriculture in the county of Middlesex, the very able and experienced author has brought together into one point of view a great number and variety of the different objections and reasons, which either operate against or wholly prevent the use of oxen for the purpose of performing team-labour; and which the inquirer, who wishes for more full information on so important a subject, may do well to consult, as they place the question with much clearness and decision greatly in favour, and on the side, of the horse.

In fact, the writer thinks it very clear, that those persons who prefer horses to oxen, for the purpose of labour, display superior knowledge in agriculture. This opinion, he says, is sanctioned by the practice of nine-tenths of the best husbandmen in the nation. In proportion as Britons become enlightened, they lay aside ox-teams; and experience has now so completely established the superiority of horses, as to render their employment almost universal. And under this system, the science and practice of agriculture have improved more rapidly than at any former period of time. "The number of horses used in husbandry are nearly," says the writer, "1,200,000. If half this number were to be superseded by oxen, in the proportion of two oxen to one horse, it would require 1,200,000 such cattle to do the same quantity of labour as is now done by 600,000 horses. The difference of these two numbers would be an increase to that extent of our labouring cattle. The other 600,000, in the place of so many horses, as well as the increased number, feed in the same manner as cows, and on a similar herbage; consequently the whole 1,200,000 would deprive us of the means of supporting so many cows. So unwise a measure would reduce the number of our cows to one-fourth of their present number. The veal, milk, butter, and cheese, would be diminished in that proportion; and in consequence of this scanty produce of the dairy, the price would be so exorbitant, that none but the most wealthy could afford to eat of these things.

"After what has been said, need I add, that every ox used in husbandry at this time deprives the nation of a cow, and of all the comforts which that animal is calculated to bestow. The introduction of oxen, to do one half the labour now done by horses, would deprive the labourers of the greater part of their diet: a dearth would be the inevitable consequence, until the numbers of our people were reduced to equal the scantiness of their food, or until the oxen could be fattened and slaughtered, to make way for the return of the more valuable cow. Hereafter I shall expect the farmers in theory only, who are advocates for ox-teams, to change their notes, and write in favour of a team to be drawn by cows."

Upon the whole, the writer is of opinion, that the very few advantages which oxen possess are not by any means of such consideration, as to compensate for the damage which their being used would do upon some kinds of land; nor are they so proper for the general purposes of a farm as horses, and the general substitution of labouring oxen in lieu of horses would be vastly injurious to the nation.

It is allowed that those who have argued in favour of the superior advantage of oxen may be correct in all their reasonings, so far as they are deduced from their own experience; but that the experience of others may furnish arguments as strong on the other side. Circumstances vary in every district, and render the good or the bad of any practice altogether relative. In the county of Chester, for instance, the farmer has not only to fallow his corn land, and lead manure to his meadows, but he has often to send his team to distances of ten or fifteen miles, to take his corn to market, to fetch lime or coal, and for various other purposes, on hard turnpike roads; and the time in which such services are performed is to him of essential consequence. Would oxen be as well able to accomplish such journeys as horses? Are oxen used in any county where circumstances are precisely similar? Do not oxen require more rest than horses? Will they stand hard work as well? Are they as ready for every different kind of work on a farm as horses? Unless these questions can be answered in the affirmative, we have to place in opposition to the saving of expence in keeping them, convenience and time, which are as valuable as corn and money. It is also further argued, that the diminution in the use of corn, from employing oxen, is an object of great national importance; all that the horse consumes being so much loss as the food of man; and the loss of animal food, occasioned by the preference given to horses, is likewise urged. But if, in the same portion of time, horses will do more work than oxen, the earth will be enabled to yield a greater produce, and the additional portion of food gained may more than counterbalance what is lost. The consumption of food, however, is not an argument which should be brought forward against the farmer, who, by every proper artificial means, should be induced to raise the greatest quantity possible from his ground. On what principle is it that the legislature, by bounties, endeavour to encourage exportation, when the prices of corn sink below a certain sum? Is it not that more may be produced, in the ordinary course of seasons, than the nation can consume, in order to secure a sufficiency when the harvests are below their average? The more horses are kept, the greater the consumption of corn, and the greater the demand; and is it not better to have it increased by such means, than by exportation? The horses, in the year of scarcity, may be fed entirely on hay or grass; and, at all times, their existence is so much real national wealth. May it not be doubted too, whether, if farmers could dispense with the use of horses, a sufficient number would, as hinted at above, be reared for the mere purposes of pleasure or luxury, to answer the demand of government, in cases of emergency? Numbers of them, of all descriptions, whether for the increase of cavalry, or the draught of artillery, are surely desirable in every country that must trust its defence exclusively to its own exertions. Even now the breeding of them is attended with so much hazard, that very many are fearful of encountering the risk: what then would be the consequence, if the demand was considerably lessened?

In respect to the feeding of teams, whether of horses or oxen, it is a point that requires much thought, care, and attention; as where a want of economy prevails, it may lessen the profits of the farmer in a very high de-

gree, as is obvious from the vast consumption of expensive food that must take place. The yearly expence of keeping a labouring horse and an ox, previous to the late rise in the different articles that are made use of as food, has been stated, in the sixteenth volume of the *Annals of Agriculture*, to be in the general amount as follows: *viz.* that of a working horse, 17*l.* 10*s.* 6*d.*; and that of a working ox, 13*l.* 1*s.* 10*d.*: so that the difference of expence in favour of the ox is 4*l.* 8*s.* 8*d.*

The difference in the expences of food, since the above period, may have probably demanded the addition of rather more than one-third to these accounts: though they are at present much lowered.

The training or breaking in the oxen for team-labour is commonly performed by first confining them by means of a halter or rope, while the yoke or harness is put on, and then placing them between a pair of old steady oxen both before and behind, so that they can neither push forward nor backward in an improper manner; and another, perhaps better, way is to yoke them singly with an old team-ox, which is not a free worker, as they are less liable to be hurt in hot weather in this way. They may also be first broken in, by being employed in other sorts of labour before they are put to the plough.

Oxen are more apt to tread, poach, and injure the land, especially where it is of a heavy, clayey, moist nature, when worked in yokes, than when in harness; yet some districts prefer the system of yokes and bows, either single or double, to the harness method, which is a later practice. And there is a wide difference of opinion among practical farmers about the superiority of the one or the other method. Some very sensible men, who have tried both ways, contend that three in harness are equal to as much work as four in the other mode, and that they are more quick in their motions, and work with more ease: while others, equally well experienced, are decidedly of opinion that the old established method is superior to the new, and that any number in yokes are equal to the same number in collars. The question is, of course, not yet well decided: however, it is agreed, that it is unfavourable to work them too hard in any method.

The necessary proportion of horses to the extent of the farm, is also a circumstance that is of much interest to the farmer; but which must of necessity vary greatly, according to the nature, situation, and state of the land, as well as the mode of husbandry under which it is conducted.

In deciding the necessary proportion of team, the farmer must likewise well consider the extent which the sward or grass-land bears to that which is in the state of tillage; as where the proportion of the former is considerable, there will be much less team-work to be executed, of course a much less strength may be sufficient. Where the farm is under the hay system, as there is seldom much team-work, except in conveying the produce and carting manure, a smaller extent of team is mostly sufficient, in proportion to the quantity of land, than in other cases. And in the dairy management, the same is the case; but as in this case it becomes necessary to raise green crops as cattle food, a somewhat stronger team may be required than in the former case.

In perfectly tillage farms, whether conducted under the naked fallow system, or the more improved management under the convertible husbandry, a much greater force of team will be required, in proportion to the extent of land that is to be cultivated. Some reduction of team-labour may, however, be effected in both cases, by having recourse

to green smothering crops in the place of the fallowings, which should always be done as much as possible.

There can be no doubt but that there are some other sorts of animals, besides those of the horse and ox kind, that may be occasionally employed in team-labour. The mule is an animal well calculated for this purpose, from its being more hardy, and enduring work a greater length of time, or to a more advanced age, than the horse. In some cases, the smaller sorts of mules have been recommended, as more hardy and useful; but in Worcestershire, large mules have been found more beneficial for team purposes.

The ass may likewise be employed for team-labour with advantage, in small concerns, from its hardy nature, and being capable of living on more scanty fare than the horse; and it is very useful for numerous purposes about the farmhouse.

Whatever sort of teams may be made use of upon farms, they should always be well attended to, and no neglect of any kind suffered in regard to them; and when attacked by disease, recourse be had as quickly as possible to proper remedies.

TEAN, in *Geography*, a river of England, which runs into the Dove, 2 miles N.E. of Uttoxeter.

TEANO, a town of Naples, in Lavora; 14 miles N.W. of Capua.

TEANUM, TIANO, in *Ancient Geography*, a town of Italy, in Campania, towards the south-east. It was a Roman colony, and a considerable town.—Also, a town of Italy, surnamed Apulum by Strabo, and Apulorum by Pliny.

TEAP, in *Rural Economy*, provincially a tup or ram. See RAM.

TEARNE, in *Geography*, a river of England, which runs into the Severn, near Shrewsbury.

TEARPOUR, a town of Hindoostan, in the circar of Sumbul; 13 miles N.N.E. of Sumbul.

TEARS, in *Physiology*, the peculiar limpid fluid secreted by the lacrymal gland. This fluid is destined to preserve the transparency of the cornea, by keeping it moist, and removing from it foreign substances. In man a preternatural flow of tears is excited by different passions of the mind, especially grief; but it is doubtful if this takes place in any inferior animal. See EYE, MAN, and PASSION.

The fluid of tears has been examined *chemically* by Fourcroy and Vauquelin, but their account of its properties is not so complete as could be wished. It is colourless and transparent, without any smell, but of a perceptibly saline taste. Its specific gravity is somewhat greater than that of water. It tinges vegetable blues green. It unites with water, both cold and hot, in every proportion. The mineral acids produce no change upon it. When evaporated to dryness, a number of cubic crystals of muriate of soda are obtained; and there are also distinct traces of a free alkali, which is soda. One hundred parts, when evaporated, leave only four of solid matter, of which about one is saline matter, and the rest a peculiar animal substance, which these chemists considered as a species of *mucus*, and which is separated likewise from tears in their fluid state, in the form of flakes, when alcohol is poured upon them. This peculiar animal matter, on exposure to the air, is stated to possess the property of gradually absorbing oxygen, which renders it thick and viscid, and of a yellow colour. In this state it is insoluble in water, and remains long suspended in it without alteration. Hence, says Berzelius, if these observations are to be depended upon, this substance bears a considerable affinity to the mucus of the nose, which probably, like that

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the Asiatic form, in which assertion he had been preceded by Pallas and Tooke. The Koriaks are supposed not to exceed 2000 families.

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**TEDDER**, **TEDDOR**, or *Tether*, in *Agriculture*, a rope or chain by which an animal is tied, and confined in the fields, that it may not pasture on too wide a range. This is very seldom a good practice, or one that should be much followed.

**TEDELER**, or **TEDLIS**, in *Geography*. See **DELLYS**.

**TEDESCHI**, or **TUDESCHI**, **NICCOLO**, in *Biography*, an eminent canonist, sometimes called "the abbot," and sometimes "Panormitanus," from the city of Palermo, the city in which, as some say, he was born, in 1386, though others make Catania his native place. At the age of fourteen he took the habit of St. Benedict in Catania, and afterwards pursued his studies at Bologna. We shall not follow him through all the stages of his advancement from one degree of reputation, and from one station of honour and trust

to another; but observe, that he accepted a cardinal's hat from pope Felix V., favoured by Alphonso, king of Sicily, and openly embraced his party during the contests about the papal throne. In 1442 he was pope's legate to Frederic, king of the Romans; but when Alphonso took part with pope Eugenius, Tedeschi retired to his church at Palermo, of which he was archbishop. He would not divest himself of the purple, though received from an anti-pope, but died possessed of it in 1445. Of the erudition of this ecclesiastic, however fluctuating and temporising he was in his politics, we have ample evidence in his works, an edition of which was published at Venice, in 9 vols. fol., in 1617.

TEDESCHINI, CHRISTIANI, a buffo tenor singer in the comic opera, who came hither from Berlin at the same time as the Paganini, 1760. He appeared first in an under character in "Il Mondo nella Luna," composed by Galuppi. Nor was his figure (which was *gobbo*) or voice fit for a more important part. He was, we believe, by birth a German, whence he had his name; but he had been in Italy, and his language on the stage, and manner of singing, were perfectly Italian.

He sung on our opera stage but one year, and afterwards devoted his time totally to scholars, and became a very fashionable and useful singing-master. Among his numerous pupils he made many good singers, the Miss Fitzpatrick's, Miss Sloper, &c. &c.; and was of use to many of our stage-singers. After accumulating a considerable sum of money by diligence and hard labour, he returned to the continent to end his days.

TE DEUM, a kind of hymn, or song of thanksgiving, used in the church, beginning with the words *Te Deum laudamus, We praise thee, O God.*—It is usually supposed to be the composition of St. Augustine and St. Ambrose.

It is customarily sung in the Romish church with extraordinary pomp and solemnity upon the gaining of a battle, or other happy event: and sometimes even to conceal a defeat.

This hymn was likewise sung in Protestant churches on days of thanksgiving for a victory, peace, or other national event. Purcell composed his *Te Deum* for the opening of the cathedral of St. Paul's, but did not live till that structure was finished.

In Boyer's *Annals of Queen Anne*, vol. iv., 1704, it is said that the hymn *Te Deum*, with other anthems, were admirably performed at St. Paul's, when her majesty went thither in great state on the day of thanksgiving for the victory at Blenheim. We are not informed by whom the music was composed; it is only said that it was performed with great solemnity by the three choirs of her majesty's chapel, Westminster Abbey, and St. Paul's. There was no instrumental band on this occasion, or any other accompaniment to the voices than the organ, which seems to have been the case in all former times, when any of our sovereigns went in state to St. Paul's.

But in 1706 we are told in the same *Annals*, vol. v. p. 333, that at a public thanksgiving for the battle of Ramillies, her majesty went in great ceremony to St. Paul's, accompanied by both houses of parliament, and all the great officers of state; when *Te Deum* was performed "with vocal and instrumental music, after the composition of the famous Mr. Henry Purcell." And this seems the first time that an instrumental band was allowed to accompany the voices in our metropolitan church of St. Paul.

In 1708, *Te Deum* was sung to excellent music at St. Paul's, composed by Dr. Crofts for the victory at Audenarde, whither her majesty went in great solemnity.

We were extremely curious to learn when and where Handel's grand *Te Deum* for the peace of Utrecht was first performed. It was natural to imagine that it was first heard at St. Paul's, and that queen Anne went thither in state on the occasion, which sir John Hawkins positively asserts, telling us that, "in 1713, the treaty of peace at Utrecht being finished, a public thanksgiving was ordered for the occasion, and Mr. Handel received from the queen a command to compose a *Te Deum* and Jubilate, which were performed at St. Paul's cathedral, her majesty herself attending the service." *Hist. Mus.* vol. v. p. 269.

But though in a paragraph of the *Post Boy*, July 2, 1713, it is announced that "her majesty goes the 7th to St. Paul's, being the day appointed for the thanksgiving, accompanied by the houses of the lords and commons;" yet in the same newspaper, from Saturday July 4, to Tuesday July 7, 1713, the public was informed that "her majesty does not go to St. Paul's July 7, as she designed, but comes to St. James's (from Windsor) to return thanks to God for the blessings of peace."

If Handel's elaborate composition had been executed at St. Paul's, a style of music so new, forcible, and masterly, must have had a great effect on an English congregation, who had never heard ecclesiastical music so accompanied. Purcell's voice parts, always pleasing, well accented, and expressive, had little assistance from an instrumental band. Instrumental music, except organ playing, was but little cultivated in our country during his time. But Handel, besides his experience in Germany, had heard operas and masses performed by great bands in Italy, with such precision and effects, as were unknown in our country till he came hither to teach us.

Handel's *Te Deum* for the battle of Dettingen, 1743, and Graun's for the king of Prussia's victory at Colin, in 1757, are the most celebrated compositions to that sacred hymn of the last century, and the most likely to survive the present.

TEDIASTUM, in *Ancient Geography*, a town placed by Ptolemy in the interior of Liburnia, near Arucie.

TEDJEN, or TEDYEN, in *Geography*. See TEDZEN.

TEDIF, a town of Syria, in the pachalic of Aleppo. Here is a Jewish synagogue; and the inhabitants have a tradition that one of the minor prophets resided here. On a hill near this town are some sepulchres and aqueducts cut in the rock; 21 miles E. of Aleppo.

TEDINGHAUSEN, a town of the duchy of Bremen; 9 miles S. of Otterberg.

TEDIUM, in *Ancient Geography*, a town of Arabia Deserta, near Mesopotamia. Ptol.

TEDLA, or TEDILA, in *Geography*, a province of the empire of Morocco, in the kingdom of Fez, which extends along the eastern side of Mount Atlas, and has to the west the province of Shavoya, and to the S. Morocco. This is a rich province, abounding in sheep, whose wool is so fine, that no silk is foster: it is used in the manufacture of caps worn by the opulent, and is sold at Fez at a very high price: its exportation being prohibited, it is consumed by the inhabitants. The province contains 450,000 inhabitants.

TEDNEST, or TEDOEST, a town of Africa, in the empire of Morocco. This town was destroyed by the Portuguese in the year 1514, and in part rebuilt by the Jews; 40 miles N.E. of Mogador.

TEDONG. See TIRUN.

TEDSI, a town of Africa, in the country of Sus, situated to the east of Tarudant; 90 miles S.W. of Morocco.

TEDZEN,

**TEDZEN**, a town of Persia, in Khorassan, on a river of the same name: 32 miles E. of Meshid.—Also, a river of Persia, in the province of Khorassan, supposed to be the ancient Oxus, and next in size to the Oxus. It has its source near Saraks; and after receiving many streams, and in the number Meshed river, falls into the Caspian sea, in N. lat.  $38^{\circ} 41'$ .

**TEE**, in the *Manege*. See *BREAST-Plate*.

**TEE-Square**. See *SQUARE*.

**TEEBAKAN**, in *Geography*, a small island in the East Indian sea, near the N. coast of Borneo. N. lat.  $7^{\circ} 52'$ . E. long.  $117^{\circ} 39'$ .

**TEECHA**, a town of Bengal; 45 miles E. of Calcutta.

**TEEDIA**, in *Botany*, so named by Perfoon, we know not with what meaning.—“*Perf. Syn.* v. 2. 166.” Brown in *Ait. Hort. Kew.* v. 4. 47. See *CAPRARIA*, sp. 3, *lusida*, on which alone this genus is founded, being distinguished by having a *berry* instead of a *capsule*, as is remarked in the place indicated. We have not had an opportunity of examining whether this be really the case, or whether it be a capsule with or without a pulpy coat; nor do we know how far Willdenow’s suggestion, that all the Cape species possibly have a similar seed-vessel, is well founded.

**TEEFEE**, in *Geography*, a town of Africa, in Kaffon; 30 miles N.W. of Kooniakary.

**TEEHEENGAN**, a small island in the East Indian sea, N. of Borneo. N. lat.  $7^{\circ} 49'$ . E. long.  $117^{\circ} 30'$ .

**TEEKOO**, a small island in the Sooloo Archipelago. N. lat.  $6^{\circ} 6'$ . E. long.  $120^{\circ} 25'$ .

**TEELNA**, a town of Bengal; 10 miles W. of Conchong.

**TEEMBIE**, a town of Africa, in the country of Foota. N. lat.  $10^{\circ} 28'$ . W. long.  $10^{\circ} 48'$ .

**TEEMBOO**, a town of Africa, in the country of Foota. N. lat.  $9^{\circ} 59'$ . W. long.  $10^{\circ} 18'$ .

**TEEN-TALLOW**, a town of Hindoostan, in Guzerat; 20 miles S.E. of Brodera.

**TEERAH**, a province of Candahar, W. of Paisshawar.

**TEERANDAZEE**, a town of Candahar; 8 miles E. of Sussa.

**TEERRAWHITTE**, the south-west point of the northernmost island of New Zealand, in the South Pacific ocean, and the N. side of Cook’s Straits.

**TEERWISCH**, a town of Prussia, in the province of Oberland; 8 miles N.N.W. of Ortelsburg.

**TEES**, a river of England, which rises on the borders of Cumberland, and runs into the German ocean, about ten miles below Stockton, N. lat.  $54^{\circ} 42'$ . The whole course forms a boundary between the counties of York and Durham.

**TEESDALIA**, in *Botany*, received that name from Mr. R. Brown, in memory of the late Mr. Robert Teesdale, F.L.S., who died on Christmas-day, 1804. This accurate English botanist was, for many years, a seedsman in the Strand, but retired from business some time before his death, residing first at Ranelagh, near Chelsea, and afterwards at Turnham-Green. He was the author of “*Plantæ Eboracenses*”; or a Catalogue of the more rare Plants, which grow wild in the neighbourhood of Castle Howard, in the North Riding of Yorkshire, disposed according to the Linnæan System;” published in the Transactions of the Linnæan Society, v. 2. 103. The author composed this catalogue whilst he was gardener to the earl of Carlisle.—Brown in *Ait. Hort. Kew.* v. 4. 83. *Sm. Tr. of Linn. Soc.* v. 11. 283. *Compend. Fl. Brit.* ed. 2. 98.—Class and order, *T-* VOL. XXXV.

*wadynamia Siliculosa*. Nat. Ord. *Siliquose*, Linn. *Crucifera*, Juss.

**Gen. Ch.** *Cal.* Perianth inferior, of four elliptical, concave, small, spreading, equal, deciduous leaves. *Cor.* Petals four, obovate-oblong, obtuse, spreading, with short broad claws. *Stam.* Filaments six, slightly club-shaped, ascending, each with a dilated ovate scale attached to its inner side, a little above the base, the two lateral ones shortest and most distant, in one species wanting; anthers vertical, of two round lobes, distant at their base. *Pist.* Germen superior, sessile, roundish, emarginate, tumid at one side, flat at the other; style scarcely any; stigma capitate. *Peric.* Pouch erect, inversely heart-shaped, tumid, with a longitudinal furrow in front; concave, with an elevated ridge, at the back, two-celled; partition lanceolate; valves boat-shaped, oblique, keeled. *Seeds* two in each cell, ovate.

**Ess. Ch.** Pouch emarginate, inversely heart-shaped. Seeds two in each cell. Filaments with a scale on their inner side, near the base.

1. *T. nudicaulis*. Naked-stalked Teesdalia. *Ait. n.* 1. *Sm. Tr. of L. Soc.* v. 11. 286. (*Iberis nudicaulis*; Linn. *Sp. Pl.* 907. *It. Oeland.* 139. *Sm. Fl. Brit.* 692. *Engl. Bot. t.* 327. *Curt. Lond. fasc.* 6. t. 42. *Fl. Dan. t.* 323? *Bursa pastoria minima*; *Ger. Em.* 276. *Shepherd’s Cress*; *Petiv. Herb. Brit. t.* 50. f. 2.)—Petals unequal.—Native of dry gravelly situations in the northern parts of Europe, flowering in April or May. It occurs about London, Norwich, and Bury, but is not a general English plant. The root is small, tapering, annual. *Herb* varying much in luxuriance and number of stalks. *Leaves* several, almost entirely radical, pinnatifid in a lyrate manner, stalked, roughish principally at the edges. *Stalks* unbranched; the central one always erect and naked; the rest ascending, spreading or decumbent, often bearing a leaf or two. *Flowers* white, very small, corymbose. *Calyx* smooth, often purplish. Two inner or upper petals as long as the calyx; outer ones full twice as long; all entire. The remarkable scales on the *stamens* were first particularly noticed in *English Botany*. On these Mr. Brown founds his principal generic character, omitting the irregularity of the petals, in which this plant agrees with *IBERIS*, though very little in its habit, which is rather that of a *LEPIDIUM*. (See those articles.) The writer of the present article has, in the Transactions of the Linnæan Society above quoted, critically investigated the history of this species and the following, and has first brought them together under one genus.

2. *T. regularis*. Regular-flowered Teesdalia. *Sm.* as above, 286. (*Lepidium nudicaule*; Linn. *Sp. Pl.* ed. 1. 643. ed. 2. 898. *Loefl. It. Hisp.* 155. *Nasturtium minimum vernum*, foliis tantum circa radicem; *Magnol. Bot. Monsp.* 187. t. 186. *N. foliis pinnatifidis*, caule nudo floribus tetrandris; *Gerard Gallopr.* 347, excluding the *Iberis* of Linnæus.)—Petals equal. *Stamens* but four.—Native of dry elevated gravelly places in the south of France, and above the convent of St. Bernard at Madrid, flowering in the early spring. The root is annual. Whole herb so precisely resembling the foregoing, except in being usually rather less luxuriant, that it is scarcely possible to distinguish them, except by the flowers. The petals of the present are all of equal size, spreading, longer than the calyx. *Stamens* only four, two at each broad side of the germen, each bearing a white expanded scale, as in the *T. nudicaulis*; the two shorter, or more spreading *stamens* entirely wanting. It is much to be wished that seeds of this species could be procured from Montpellier, that we might compare both in a living state. Linnæus was always persuaded of their being distinct.

TEESE, in *Geography*, a town of Africa, in Kajaaga. N. lat.  $14^{\circ} 50'$ . W. long.  $9^{\circ} 27'$ .

TEESHOO LOOMBOO, or LUBRONG, a town and large monastery of Thibet, consisting of three or four hundred habitations of the Gylongs, besides temples, maufolea, and the palace of the sovereign pontiffs, all built of stone; 2 miles S.W. of Sgrigatehee.

TEESTA, or Yo SANPOO, a river of Asia, which rises in Thibet, and runs into the Ganges by two streams, one 25 miles N., the other 80 E.S.E. of Moorshedabad.

TEETBADDY, a town of Bengal; 27 miles N.E. of Dacca.

TEETH, *Diseases of the*. The diseases which affect the teeth and the parts connected with them, are usually divided into two kinds; namely, into such as are termed *common*, because they are also met with in other parts; and into those which are called *proper*, being observed only in the teeth. Hence, as the celebrated Plenck has remarked, the subject may be conveniently treated of under the following heads. Doctrinâ de Morb. Dentium, &c. Lovanii, 1796.

*Of Natural Dentition.*—The process by which the teeth make their way through the gums, is named *dentition*, (see DENTITION,) which may be divided into the *first* and *second*.

1. *Of the First Dentition.*—In the sixth or seventh month after birth, the *first* or *milk* teeth make their appearance through the gums. The two middle incisors of the lower jaw are those which most frequently first come out, and, in the course of a few weeks, they are generally followed by the two middle incisor teeth of the upper jaw. At length, after some months more, the lateral incisors and the canine teeth shew themselves. The anterior molares, or front grinders, do not commonly pass through the gums until the child is a twelvemonth old.

The third and fourth grinders are cut about the tenth or twelfth year, and the dentes sapientiae at the age of twenty, or even at a more advanced period of life.

The *first* dentition, therefore, lasts from the sixth month to the second or third year. The *second* from the ninth to the thirteenth year.

But it is to be observed, that the interval betwixt the periods when the teeth are actually cut, is subject to very great variety, both with respect to different teeth and different children. Sometimes a month, sometimes half a year, and, on other occasions, a whole twelvemonth will elapse between the first appearance of one tooth and that of another.

The cutting of each tooth has two distinct stages; the first of which has been called the *periodus ingressus*; the second, the *periodus egressus*.

The first stage is usually observed in the fourth month, or about six weeks before the tooth passes through the gums. It happens when the tooth, in consequence of its augmented size, begins to press against the bony laminae of the socket, so as to make them recede. At this period the child feels a degree of itching in the gums, and hence it is that he now frequently puts into his mouth his fingers, or other hard bodies, and compresses them by strongly biting them between the gums. The secretion of the saliva is increased. The gums become red, and swell in the situation of the tooth which is about to be cut. When the child sucks, he irritates and bites the nipple; he is also commonly troubled with a purging and a cough; he is watchful, cries frequently, and becomes feverish.

Sometimes, however, dentition takes place so easily, that none of the preceding symptoms are remarked.

After a few days, the above complaints generally cease,

but not unfrequently come on again in about a fortnight or a month, that is to say, about the commencement of the second stage, or that in which the tooth makes its egress. Then the gum grows white, or exhibits whitish points in the situation of the tooth which is about to be cut. These are caused by the tooth itself, and disappear as soon as it has passed through the gum.

2. *Of the Second Dentition.*—In the seventh or eighth year, the milk-teeth, amounting in number to twenty, become loose, and gradually fall out, generally in the same order in which they were cut. Soon afterwards, the second or permanent teeth rise out of the gums. It hardly ever happens, that the second dentition produces any dangerous symptoms, the passage through the alveolar process and gum being now sufficiently capacious.

After the milk-teeth have spontaneously fallen out, or been extracted, they are almost always found to be destitute of fangs. This is a circumstance which has puzzled many eminent writers, and has even given birth to the erroneous doctrine, that the milk-teeth are never furnished with fangs. Suffice it here to say, that in the opinion of the best informed modern surgeons, the disappearance of the fangs is the effect of absorption.

Sometimes children, but more frequently adults, cut their teeth a third time. It is said that dentition has been observed to happen thrice in an infant five years of age; and Plenck was acquainted with a man, who was born with two of the grinding teeth, which were afterwards changed twice. (Doctrinâ de Morbis Dentium, p. 10.) Even a fourth dentition has been noticed by some very experienced men. Halleri, tom. viii. l. 30. p. 22.

*Of Difficult Dentition.*—The advance of the teeth out of the sockets or gums may be attended with the most alarming symptoms. But experience proves, that in numerous children, the whole semicircle of each jaw becomes furnished with teeth, without the slightest mark of indisposition either before, or during the progress of the teeth through the gums. In other instances the worst symptoms prevail, both while the teeth are making their way out of the sockets, and through the gums; such as an inflammatory swelling of the gums, tonsils, and parotid glands; redness of the eyes and cheeks; vomiting, griping pains, tenesmus, profuse diarrhoea with green evacuations, and sometimes obstinate costiveness and retention of urine. Fever, accompanied with cough and other catarrhal affections, hiccough, universal or partial tetanus, convulsions, &c. are the symptoms by which, according to the estimate of several writers, nearly a third of children are destroyed in difficult dentition.

These are the *common* symptoms of difficult dentition; but occasionally *peculiar* ones arise, which not unfrequently subside as soon as the tooth is cut; as, for instance, gutta serena (Lorry, Traët de Morb. Cutaneis, 1777, p. 411.); deafness; amaurotic blindness; enlargement of the knees; paralysis; and lameness of one or both legs. (Pasch, Abhandlung aus der Wundarzney von den Zähnen, S. 25. 36.) Aphthæ of the mouth; an inflamed tubercle over the tooth which is about to be cut; suppuration, ulceration, and even sloughing of the gums. Rachitis is also alleged to have its origin sometimes from difficult dentition.

These effects are particularly met with in very plethoric and irritable children; or in infants whose bowels are overcharged with irritating excrementitious matter. Too much laxity, or too great hardness of the gums, is hardly ever the sole cause of such symptoms.

With regard to the prognosis, it may be remarked, that favourable dentition is a sign of future health. Ricketty children almost invariably cut their teeth with difficulty.

The

## TEETH.

The more numerous the teeth are which are making their way out together, the more severe are generally the symptoms, and the greater is the danger.

Bloated, colic, heavy children are extremely liable to be carried off by dentition.

The incisors and grinders usually come out with more ease than the canine teeth. Thin children, who are affected with acute fever, and whose bowels are open, are in less danger from dentition. Infants who have a cough during this process, are often a long while in cutting their teeth. The foregoing prognosis accords with what was pronounced upon the subject by Hippocrates, whose accuracy remains unimpeached.

As the symptoms of dentition are partly *inflammatory*, being accompanied with a strong determination of blood towards the head and brain; and partly *spasmodic*, in consequence of the sympathy of the teeth with other parts, the treatment requires that antiphlogistic and antispasmodic means be employed. It is necessary, therefore,

1. That the bowels be kept open with emollient clysters.
2. That leeches be applied behind the ears.
3. That the syrup of poppies, with nitre and one or two drops of laudanum be internally administered.
4. That the red part of the gum over the tooth which is about to be cut, be rubbed with a mixture of lemon-juice and honey, or cream.
5. That in the event of there being a tendency to convulsions, in addition to the other symptoms, a division of the gum be made over the tooth. By the majority of practitioners, indeed, the last is considered as by far the most useful and efficient means of relief.

This incision is to be made through the gum with the common instrument, well known by the name of the gum-lancet, which is far better for the purpose than an ordinary lancet, which is apt to cut the tongue and lips, especially when the child moves about much. The grinding teeth require a crucial incision: all the others a simple transverse cut completely through the gum. The wound is then to be examined with the finger, in order to ascertain that no tense fibre over the tooth continues undivided. In this country, practitioners seldom apply any thing to the incision; but abroad, it is not uncommon to put to it a mixture of lemon-juice and honey.

Internally, antispasmodics may be exhibited, particularly the syrup of poppies, with the spiritus ammoniæ fucinati.

In order to promote dentition, and render its effects on the constitution as mild as possible, the celebrated Plenck recommends, that as soon as the infant is five months old, its gums be rubbed several times a day with a mixture of lemon-juice and honey, first over the middle incisors of the lower jaw, and when these have come out, over those of the upper jaw.

Emollient remedies are said to relax the gums too much, the consequence of which is, that the loose gum is slowly and difficultly perforated by the tooth, as instead of ulcerating, it is only raised and rendered tense.

The use of hard applications, as biting the root of marsh-mallows, smooth corals, boars' tusks, &c. render the gums callous; but more good might, perhaps, be derived, if substances with rough surfaces were employed.

A premature incision of the gum soon closes again, and therefore does little service; but we do not believe that the cicatrix, thus produced, can be any impediment afterwards to dentition, as many have imagined; for it is an established fact, that cicatrices in general are more disposed to ulcerate and be absorbed, than the original parts of the body.

We would never suffer any idle apprehensions of the above sort to deter us from dividing the gum, were there any chance of benefit from the proceeding. At the same time, we do not recommend this as a prophylactic measure, but as being proper only when illness, suspected to arise from dentition, actually exists.

*Premature Dentition.*—This is stated to happen, when the milk-teeth come out before the infant is six months old. Sometimes children are even born with their teeth already cut. Rzaszynky, Rhodius, P'Eluse, and Storcck, mention a boy, who had the molars at the time of birth. Also in an abortion of six months, and another of seven, teeth have been observed. (Halleri Elementa Physiol. t. vi. p. 19.) Van Swieten met with two incisors in an abortion of five months. (Comm. t. iv. p. 742.) In a very weak male child, born at eight months, Arnold saw two perfect teeth rise out of the lower jaw on the seventh day after birth, and grow with extraordinary quickness; but they fell out in the eighth week from their first appearance. Obf. Physico-Med. p. 70.

In general it is to be concluded, that early dentition indicates great constitutional vigour and strength.

*Of Backward Dentition.*—Backward dentition is when the milk-teeth are not cut, though the child is a twelvemonth old, or even older. The proximate cause of this delay is generally referred by medical writers to languor and weakness of the constitution. But late dentition is of several kinds.

1. Backward dentition from an unknown cause sometimes happens, the teeth not making their appearance for a year after birth, notwithstanding the children have not any appearance of debility. Van Swieten met with a most healthy female child, who was nineteen months old when she cut the first tooth. Comm. t. iv. p. 742.

2. Backward dentition from the rickets. It is universally known, that in rickety children the cutting of the teeth is a long while delayed. In these subjects the gums are always much relaxed, and we have already stated, that this circumstance is by no means favourable to dentition. It is probable, also, that in rickety infants the teeth themselves are a long while before they are perfectly formed, it being well ascertained, that in such constitutions the deposition of the phosphate of lime takes place with extraordinary slowness and difficulty.

3. Backward dentition of the dentes sapientiæ. The wise teeth are seldom cut before the twentieth year, and sometimes they first come out in persons considerably advanced in years. Halleri Element. Physiol. t. vi. p. 28.

4. Late dentition in adults. Sometimes this takes place a third time, chiefly with respect to the incisors; and instances are actually recorded, in which these teeth were cut in adults, or even in old persons. Haller quotes examples, in which they were cut at the ages of 90, 95, 100, 118, 120, and later. Halleri, l. c. t. viii. l. 30.

*Wrong Situation of the Teeth.*—This happens when the teeth make their appearance in the palate, or in any place not comprised in the alveolar arches. The proximate cause of this unpleasant occurrence is the preternatural formation of the young tooth in an erroneous situation.

The cases may be of different kinds, in regard to the place which the tooth occupies.

1. When a tooth grows out of the palate, it obstructs mastication, and by rubbing against the tongue, often makes it ulcerate. The inconvenience can only be remedied by extracting the displaced tooth.

2. The tooth may come out under the tongue. This case produces the same grievances as the preceding, and requires the same mode of relief.

## TEETH.

3. The next curious circumstance which we have to notice, is the growth of teeth in the ovaries. It is now believed, that the teeth sometimes found in these organs, are not always the relics of a previous embryo, but may be formed there as a *lufus naturæ*. An instance, in which a tooth was formed in an encysted swelling in the orbit, has been lately recorded by Mr. Barnes of Exeter. See *Medico-Chir. Transf.*

4. Albinus records an example, in which a tooth grew out of the maxillary process below the orbit. It was concealed until it made its way out in this extraordinary situation. *Annot. Acad. t. i. p. 54.*

5. The teeth have sometimes been observed inverted, their bodies being situated towards the jaw. *Pollich, Increm. Offium, p. 25. Albin. c. 9. Palfin, c. 9.*

*Extraordinary Distance of the Teeth from each other.*—Sometimes the teeth are placed too distant apart, so that between their crowns large interspaces are left.

1. In children three years of age, the crowns of the milk-teeth are so close to each other, that they are laterally as it were in contact; but in children seven years old, there are wide interspaces between them. The reason of this is owing to the jaw increasing in size, while the dimensions of the teeth undergo no alteration. The second or permanent teeth, on the other hand, (at least the first twenty of them,) have larger bodies than the milk-set.

2. Frequently the tartar insinuates itself between the crowns of the teeth, and occasions a considerable separation of them. We need scarcely observe, that the cure requires that the tartar should be taken off, and the teeth reduced into their natural position.

3. The deformity of which we are now treating, is occasionally ascribable in adult subjects to the preternatural breadth of the jaw, in which circumstance it is absolutely incurable.

*Extraordinary Closeness of the Teeth.*—The teeth may be too crowded together, so that their crowns are laterally in contact. This defect may extend to some or all the teeth. The frequent consequence is, that the lateral margins of these parts become carious.

There are two species of the disorder.

1. The first arises from the great width of the crowns of the teeth, and it may be ascertained by ocular examination. In some instances, all the bodies of the teeth are preternaturally wide; in others, only a certain number of them.

The mode of cure consists in filing off a little of the lateral edges of the teeth affected.

2. The second species is caused by the uncommon shortness of the jaw. It may be known by observing that the crowns of the teeth are not too large, and that the alveolar arches are strikingly diminutive.

Here the mode of relief is the same as in the foregoing case.

*Extraordinary Number of Teeth.*—Sometimes the number of the teeth exceeds what is the usual share of the human species in general; and this particularly occurs whenever the number amounts to more than thirty-two. Columbus has seen thirty-three (p. 34.); Fauchart, thirty-three and thirty-four (edit. 2. tom. i. p. 3.); Bourdet, thirty-six (p. 25.); and Ingrassias, thirty-six, including twenty-four grinders. *Text 2.*

1. With respect to the redundant number of each class, it is when there are six incisives, or four canine teeth, or more than ten molares in one jaw. The case is incurable.

2. In some instances, the excessive number is owing to there being a double row of teeth. This malformation may happen to both jaws, or be confined to one. It has been

noticed in both jaws by Munick, p. 144; Plinius, c. xi. p. 623; C. Bartholinus, p. 464, &c.

Arnold met with a boy, fourteen years old, who had altogether seventy-two teeth in his mouth. There was a double set of the incisives, canine teeth, and three posterior grinders; but the anterior grinders were tripl: consequently there were counted in each jaw eight incisives, two canine on each side, and twelve molares. The incisives were not arranged in an even double row, but each row seemed irregular, and its order as it were promiscuous. The arrangement of the canine and grinding teeth was more regular. None of these teeth were affected with caries. *Obs. Physf. Med. p. 69.*

3. There may be a larger number of teeth than common, in consequence of the presence of one of the milk-teeth; for when the latter does not fall out at the usual period, the corresponding permanent teeth come out in the vicinity of it.

Here the cure consists in drawing the superfluous milk-tooth.

*Deficient Number of Teeth.*—Sometimes the number of the teeth falls short of what is usual; and this happens whenever they are fewer in the adult subject than thirty-two.

1. The defective number may be owing to a preternatural shortness of the jaw. Sometimes one or more teeth remain concealed during life. Thus, the *dentes sapientie* are never cut in persons who have the upper or lower alveolar arch not sufficiently long.

2. The sex also makes a difference; women, generally speaking, having fewer teeth, than belong to men. *Riolan, p. 38, and 39.*

3. The deficiency in the number may proceed from a tooth having been drawn, or dropped out. This is evidently a case which can only be remedied by the insertion of an artificial tooth.

4. Lastly, the limitation of the number may be owing to infancy; for, in children under seven years of age, the natural number of the teeth does not exceed twenty.

*Obliquity of the Teeth.*—The position of some or all the teeth may be oblique; an inconvenience which may be caused by the milk-teeth not being shed, by tartar insinuating itself into the interspaces of the teeth, by looseness of the alveoli, and, lastly, by a forcible luxation of the teeth affected. The milk-teeth seldom grow obliquely; the permanent ones do so much more frequently. The molares hardly ever rise in a wrong direction; and, in general, they are only the incisives and canine teeth which deviate from the right position.

With regard to the effects of such obliquity, we have to observe, that the teeth affected impede mastication, interfere with the articulation of words, seriously disfigure the countenance, and, unless drawn, or replaced in their natural position, may occasion incurable ulcers on the tongue, lips, or cheeks.

The differences of the obliquity make these cases divisible into several kinds.

1. The obliquity forward is when the tooth projects anteriorly, so as to hurt the cheek or lips. Such a tooth may cause ulceration of these parts, as already mentioned. The parotid duct has been known to be perforated, and a salivary fistula brought on, by an oblique tooth in the upper jaw. *Pafch, l. c. p. 71.*

2. The obliquity backward is when the position of the tooth inclines towards the centre or posterior part of the mouth, so as to be capable of hurting the tongue. Teeth, so circumstanced, have sometimes been the cause of ulcers on the tongue, which in point of obstinacy and malignancy have truly vied with cancer. *Plenk* informs us, that by drawing

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ing the left eye-tooth, he once cured an ulcer, which had existed half a year on the left edge of the tongue. P. 20.

3. The converging obliquity is when the crowns of the teeth converge in their situation, or even cross each other.

4. The diverging obliquity is when they diverge.

5. The lateral obliquity is when the side of the body of the tooth is turned more or less forwards or backwards.

6. Obliquity of the fang. Sometimes the fangs of the teeth are curved so obliquely backwards or forwards, that the bottom of the sockets either projects like a small exostosis, or is completely perforated.

*Of the Reduction of an oblique Tooth.*—With respect to one of the permanent teeth, which is rendered oblique by the presence of one of the first set, the treatment consists in immediately extracting the latter.

The milk-tooth may be known by its pearl colour, its more polished surface, and its smaller size. The permanent tooth is longer, whiter, stronger, and of greater breadth. The crowns only of the second set of grinders are shorter than those of the milk-set. Albini, Annot. Acad. l. ii. p. 19.

But an oblique permanent tooth may be replaced in its right position, by the following means.

1. When the child is very young, and the tooth quite recent, it may be reduced into its proper situation, by frequently pressing upon it with the finger in the course of the day.

2. Or the reduction may be effected with a double silk-thread, smeared with wax and mastic. A noose is to be made at each end of the thread, and fastened to the adjacent teeth. The thread, being then divided into two, is to be made to cross two or three times firmly over the oblique tooth.

3. By a metallic plate. The length of the plate should exceed the measure of the two neighbouring teeth, together with the oblique one. Its width should be less than the height of the teeth. It is to be applied to the inside of such teeth as incline inwards, and to the outsides of those which incline outwards. At the ends of the plate are two holes, through which the silk-threads, smeared with wax, are to be passed, and, after crossing each other, are to be tied over the oblique tooth.

4. By Bruner's machine. When the tooth does not admit of reduction by the preceding means, Bruner's machine may be tried. See A Bruneri Einleitung zur Wissenschaft eines Zahnarztes, p. 83.

When several of the teeth are oblique, the cure is to be attempted by the same operations; but when the side of a tooth inclines forward, it is necessary to use the forceps to bring the part into its right position.

*Looseness of the Teeth.*—Sometimes the teeth become loose and moveable in their sockets. The proximate cause of this affection may depend upon the loss of the elasticity of the alveoli and gums, upon the too great or too small size of the sockets, or upon the absorption or wasting of the fangs. Loose teeth are very inconvenient in mastication, and easily drop out.

Of this complaint there are several species, the differences of which are referrible to the causes.

1. Looseness of the teeth from second dentition. After the seventh year, the twenty milk-teeth begin to grow loose, and fall out, nearly in the same order in which they were cut.

2. Looseness of the teeth from age. In old persons the sockets become contracted, and the canal in the fangs being obliterated, these parts also diminish. Hence we see the reason why the teeth frequently become loose in subjects advanced in life.

3. Looseness of the teeth from violent concussions. A forcible concussion, such as happens in falls against the teeth, diminishes the elasticity of the gums and sockets, and of course may be a cause of the present disorder.

The cure requires corroborant washes: the tinctura laccæ, astrigent decoctions, red wine, spirit of wine, or the terra catechu or sanguis draconis, dissolved in camphorated spirit.

4. Looseness of the teeth from relaxation of the gums. There are people whose gums are pale and relaxed, at the same time that there is no appearance of scurvy.

Here the cure is to be accomplished by the means recommended for the preceding case.

5. Looseness of the teeth either from caries of the socket or fang. This case may be known by the emission of pus from the socket of the loose tooth. Sometimes a cure may be effected by gargles; but, in general, if the tooth is also painful, it ought to be extracted.

6. Looseness of the teeth from scurvy of the gums. In subjects with scurvy, the gums become loose and fungous, and the sockets filled with a fetid purulent matter: hence the teeth are loosened.

The cure requires the internal exhibition of antiscorbutic medicines, and the use of antiscorbutic washes.

7. Looseness of the teeth from mercury. Mercury acts specifically upon the gums, destroying their tone, and promoting the secretion of saliva. Hence, persons using mercury, either outwardly or inwardly, are liable to have their teeth rendered loose.

The cure demands purgative medicines, the expulsion of the mercury from the system, and the use of tonic gargles.

*Defect of Teeth.*—When the teeth are entirely wanting, several very unpleasant effects are necessarily the consequence. The proper mastication of the food being then absolutely impossible, cardialgia, and other complaints connected with difficult digestion, are produced. The deficiency of the grinding teeth occasions a collapse of the cheeks, and of course an unflattering emaciation of the countenance; while the want of the incisores spoils the voice.

1. It is natural for all young infants to be without teeth, until they are seven or eight months old; but when the teeth do not begin to come through the gums after a child is a twelvemonth old, then the backwardness of dentition may be considered as morbid.

2. In old persons, the teeth naturally fall out, and the alveoli contract into a kind of sharp edge, covered with the callous membrane of the gums, by which the softer species of food may yet be chewed.

3. Want of teeth from rickets. When the rudiments of the permanent teeth are destroyed with the milk-teeth, then of course no secondary teeth ever make their appearance.

4. Loss of teeth from violent causes. Under this head we comprehend the defect of one or several teeth, drawn, or beaten out.

5. Loss of teeth from necrosis. Every form of this disorder makes the teeth fall out in little pieces.

6. Loss of teeth from scurvy. In situations where the scurvy is prevalent, it is common to meet with numerous persons who have lost their teeth in the very prime of life.

Every kind of deficiency of teeth, except that which belongs to infancy, cannot be remedied in any other way but by the insertion either of artificial or natural teeth.

*Of the Insertion of Teeth.*—There are various species of this operation, but all of which may be included under the following heads.

1. The insertion of a healthy proper tooth. When a tooth that has been extracted, or beaten out, appears to be entirely sound, it is to be immediately replaced in the socket, and tied with thread to the adjacent teeth. Sometimes it  
spon-

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spontaneously becomes fixed again, if care be taken to use an astringent gargle with a view of making the gum contract.

2. The insertion of a proper tooth that has a carious fang. When the tooth, which has been removed from the alveoli, is merely carious in the fang, it may be replaced again, after the carious part has been filed away.

3. The insertion of a proper tooth, which has a caries of its body or crown. When a very small portion of the crown is carious, it may be removed with a file, and the tooth can then be put into its socket again. But if the whole body be diseased, it may be cut off transversely from the root; a small hole may be drilled across the latter part, and, with the help of a golden wire, an artificial crown or body, having also a transverse hole for the passage of the wire, may be fastened to the root. In this state, the tooth may be replaced.

4. The insertion of a tooth taken from the mouth of another living subject, or from a dead subject. The person, to whom the tooth is to be transferred, should not be above the age of forty; but the subject, from whom it is to be taken, ought not to be more than four-and-twenty. The transplanted tooth should belong to the same jaw and side of the face, and be of the same shape and size, as the tooth that is extracted.

The canal of the tooth, which is to be inserted, must be closed with gold; and the tooth must be every where rendered free from inequalities, so that it may be the more likely to adhere.

5. The insertion of an artificial tooth. The form and size which should be given to the artificial tooth must be determined by a model of soft red wax, which has been pressed into the gap made by the lost tooth. In order that the white colour of the artificial tooth may correspond to the light yellowish colour of the rest of the teeth, the new tooth should be macerated in strong coffee, or in the lees of red wine.

Artificial teeth ought to be made of ivory, or of the tooth of the hippopotamus. Each of them should be grooved on both sides, and perforated transversely, so as to admit of being tied to the neighbouring teeth. The nooses of two threads are to be fastened on the neighbouring teeth, and the ends having been drawn transversely through the hole of the artificial tooth, and there made to decussate, they are to be tied in a surgeon's knot. The tooth having been placed in the socket, the threads betwixt the artificial and old teeth must be tightened and made fast. Lastly, an astringent gargle must be used for a few days.

6. The insertion of several artificial teeth. When two, three, or a larger number of contiguous teeth are wanting, an equal number must be formed of one piece of ivory, or other substance, and fastened at once to the neighbouring teeth.

7. The insertion of a whole set of artificial teeth. When all the teeth of the upper and lower jaws are lost, a complete set may be fixed on the margins of the alveolar arches. Should any of the natural teeth remain, they may often be of great assistance, in rendering the lodgment of the artificial ones more firm and secure. When the whole, or the greater part, of the teeth of either jaw is lost, an artificial set may also be inserted.

The custom of wearing ivory teeth, and of binding them in with a gold wire, is very ancient: Lucian and Martial speak of it as practised among the Romans. But ligatures of wire have been found to hurt the natural teeth, with which the artificial are connected; whereas silken twist cannot affect them to any considerable degree for several years.

Guilleman gives us the composition of a paste for making artificial teeth, which will never grow yellow: the composition is white wax granulated, and melted with a little gum elemi, adding powder of white mallich, coral, and pearl.

Thus whole sets may be made for one or both jaws, so well fitted to admit of the necessary motions, and so conveniently retained in their proper situation, by means of springs, that they will answer every purpose of natural teeth, and may be taken out, cleaned, and replaced by the patient himself with great ease.

*Wearing out of the Enamel.*—(See CRANIUM.) The bodies of the grinding teeth being wide, excessively hard, and exposed to perpetual friction, they become worn much sooner than the rest of the teeth, and flat in consequence of the destruction of their points. Halleri Element. Physiol. t. vi. p. 29.

With respect to the effects of the loss of the enamel, it is to be observed, that the teeth which are deprived of it become so sensible, that painful sensations are produced in them by heat and cold, and by solid as well as liquid aliment. In the end, also, they readily become carious.

The species of this affection depend upon the causes.

1. Loss of the enamel from age. After the age of thirty, almost all the teeth in the human subject have been somewhat worn by long mastication. Some writers assert, that in youth, the waste of the enamel may be repaired by nature; but if the teeth be destitute of vascularity, the evil must be always irreparable. See CRANIUM.

2. Loss of the enamel from gnashing of the teeth. Persons who in the night are in the habit of gnashing their teeth destroy the enamel. For the purpose of preventing the ill consequences of this practice, it has even been recommended to cover the teeth in the night-time with a thin gold plate.

3. Destruction of the enamel by the use of tobacco-pipes. Plenck informs us, that in the incisor teeth of men, who had for many years been accustomed to smoke pipes, he has seen the distinct impression of a black semicircle.

4. Loss of the enamel from long and violent brushing of the teeth. They who daily rub and brush their teeth forcibly with a rough hard tooth-powder, or too stiff a brush, inevitably destroy, in the course of a few years, all the enamel on the front surface of the teeth. Here the cure obviously depends upon the avoidance of the cause.

5. Loss of the enamel from applying the file to the teeth. Whenever this operation is carried to too considerable a depth, the enamel is removed by mechanical violence.

6. Loss of the enamel from biting a very hard body. This sort of violence sometimes splits the enamel, which immediately falls off in pieces, at the very time of making the bite.

7. Loss of the enamel from its being preternaturally brittle. When the enamel is thus affected, it is apt to break in chewing and biting substances without the exertion of any particular degree of force.

8. Loss of the enamel from the projection of an opposite tooth. A tooth which juts out considerably, so wears the corresponding tooth in the opposite jaw, as to make a deep impression in it. The treatment consists in shortening the tooth, which is injurious on account of its length, with a file.

*Concretion of several of the Teeth into one Mass.*—A true ankylosis of the teeth cannot happen from any process like ossification, because they possess no vascularity; and some of the cases, referred to by writers, were probably original malformation.

There are several varieties specified.

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1. The true concretion of the teeth, which happens when the teeth are connected together by a substance resembling bone.

2. The spurious concretion, or that arising from the excessive closeness of the teeth to each other, in which state they seem as if they had actually grown together.

3. The concretion from tartar. Sometimes the interspaces of the teeth are so filled up with tartar, that the teeth cohere in such a degree, as to cause an appearance resembling what may be supposed to proceed from an actual bony concretion of those bodies. The mode of treating this case will be considered in speaking of the tartar of the teeth.

4. The close contact of the fang of the tooth with the socket. In this circumstance, the tooth either cannot be extracted, or, in the event of great force being used, the tooth is broken away from the jaw.

*Elongation of the Teeth.*—Sometimes one or more of the teeth appear to become longer.

1. Elongation of a tooth from the deficiency of the opposite one. Thus, when one of the molares of the upper jaw is drawn out, the corresponding tooth of the lower jaw seems lengthened; because after a time the neighbouring teeth are worn down by the friction which they continually exercise against each other.

2. Elongation from preternatural softness of the tooth. Plenck informs us, that he has seen in a female child eight years old, the right canine tooth of the lower jaw elongated, and which, after being extracted, was found so soft, that the crown and fang could be compressed with the finger.

3. Elongation of a tooth from excessive growth is mentioned by writers; but this case cannot be possible, as the teeth are known not to be vascular.

4. Imaginary elongation. Persons whose teeth are affected with stupor, are apt to fancy that their teeth are longer than natural; but without real cause. The cure consists in removing the stupor.

*Foulness of the Teeth.*—The teeth are often seen covered with a fordid, fetid, yellowish, or dark-brown mucus.

The proximate cause is the adhesion of the mucus of the mouth and fauces to the surface of the teeth.

1. Morning foulness. In almost all men, the teeth become coated in the night during sleep with a dirty mucus, and appear foul in the morning. The reason is, because during sleep the saliva is more slowly secreted in the mouth; and, on account of the motionless state of the tongue and jaws, it is not washed off the teeth.

This species of foulness is easily removed by washing the mouth every day with cold water, and the teeth with a bit of rag, the finger, or a wet sponge.

2. Foulness of the teeth from neglect to clean them. They who are not in the daily habit of washing their mouths and teeth with cold water, by degrees have the interstices and fangs of their teeth incruited with mucus in the morning, and with the remaining particles of the food.

With respect to the treatment, merely washing the mouth in this instance is not enough; it is also requisite to clean the teeth occasionally with tooth-powder.

3. Foulness of the teeth from fever. This is remarkably seen in cases of putrid fever, in which, owing to the state of the saliva, the teeth become covered with a yellow or dark-brown coat.

Here the teeth should be frequently washed and cleaned with vinegar.

4. Foulness from ptyalism, especially that produced by mercury. In the beginning of a salivation, the teeth become coated with mucus. The best treatment is to wash and clean them frequently with a honey gargle.

5. Scorbutic foulness. In persons labouring under scurvy, the teeth are invariably covered with a purulent kind of mucus, issuing from the sockets of the loosened fangs.

The cure demands the internal and external employment of anti-scorbutic remedies.

6. Foulness of the teeth from tartar. In the early state of the formation of tartar, the surface of the teeth becomes covered with a mixture of earth and gluten.

The treatment consists in removing the tartar with a thick tooth-powder.

*Of cleaning the Teeth.*—In persons whose teeth are perfectly found, it is only necessary to wash their mouths every morning with water that has had the chill taken off it, and that contains a few drops of the spirit of lavender; the mucus being wiped from the teeth with a bit of rag, or sponge. The same should also be done after meals, and the fragments of meat lodged between the teeth must be removed with a tooth-pick, which instrument some recommend to be made of juniper wood.

But in persons in whom a deposition of tartar readily takes place, the tartar ought to be removed with a tooth-scraper, and the teeth well cleaned every week with tooth-powder.

Charcoal, or carbon, is used for cleaning the teeth, and the best is made from the shell of the cocoa-nut. We are informed by historians that the ladies among the ancient Britons used the charcoal made with the wood of the common hazel-nut for this purpose. See DENTIFRICE.

The absorbent earths are used for dentifrices; they mechanically cleanse the teeth from the thick mucus and tartar, and at the same time preserve the tone of the gums. Therefore,

1. The basis of dentifrice powders may be prepared shells, red corals, mother-of-pearl, powdered crabs' claws, bone of the cuttle-fish, lapis hæmatites, &c.

2. For communicating an agreeable colour to the powder, carmine or cochineal may be added.

3. For giving an agreeable odour, ambergris, cinnamon, or cloves may be used.

4. For strengthening the gums, armenian bole, sanguis draconis, or terra catechu, is the best ingredient.

Rough tooth-powders, like that containing pumice-stone, gradually wear away the enamel, especially when they are employed every day.

Acid applications, particularly the mineral ones, do indeed whiten the teeth; but when long used, render them brittle.

Hence crude and burnt alum ought to be rejected from every kind of dentifrice. The nitric, muriatic, and sulphuric acids in tinctures are still more hurtful.

*Of the Tartar of the Teeth.*—This substance is an earthy crust, which adheres to the teeth. As it fills up the interstices of several of the teeth, and occupies their external surfaces, it is seldom observed upon their insides. By the Greeks it was called *odontolithos*, from *odontes*, a tooth, and *λιθος*, a stone. By others it has been termed *tophus*, vel *calculus dentium*.

With regard to the effects of the tartar, it displaces the teeth, and renders them loose and painful; it also separates the gums from the fangs, producing caries in the latter, and a bad smell in the breath.

In respect to colour, the tartar of the teeth is of three kinds, namely, dark-brown, yellow, and black.

Since many persons who never clean their teeth at all are not disfigured with these depositions of tartar, it appears that a peculiar disposing cause is necessary for the occurrence of the complaint. The species are:

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1. Tartar from neglect to wash the mouth. It originates from the gluten of the saliva, which, in uncleanly scorbutic subjects, and great wine-drinkers, adheres to the teeth, becomes putrid with the heat, and in putrefying deposits a sort of earthy matter upon the teeth. People who drink chiefly water are seldom troubled with earthy incrustations on their teeth.

The cure requires the removal of the tartar. Small portions of tartar may be taken off by means of a brush and a thickish tooth-powder.

But when the tartar is abundant, thick, and grown, as it were, to the teeth, it must be cut with a suitable instrument placed obliquely, beginning from the neck, and carrying the instrument towards the upper part of the tooth. The tartar having been cut, is then to be removed piecemeal.

Any remaining particles of tartar may afterwards be gradually got rid of by the use of a brush and tooth-powder.

2. Spontaneous tartar. There are certain persons, whose teeth are constantly incrustated with tartar, notwithstanding they are in the continual habit of washing their teeth and mouths.

This peculiar diathesis seems to consist in an extraordinary quantity of earthy matter in the saliva.

Berdmore relates a surprising example of this sort of tartar. A man, thirty-two years of age, had the teeth of each jaw coated with solid tartar, half an inch in thickness, both on the outside and inside of the teeth, and on the surface of the gums, so that the interstices of the teeth were altogether invisible. The gums were every where pushed off the teeth, and painful. The incrustations upon the incisor teeth were so thick, that the lower lip was rendered more prominent. During a fortnight, Berdmore removed every day some of the tartar from the teeth with an instrument, and at length employed a dentifrice and brush. The retracted gums were scarified, and thus made to adhere to the necks of the teeth. The patient was obliged to brush his gums and teeth three times a day, partly with a view of preventing the new formation of tartar, and partly in order that the regeneration of the gums might be still more promoted. But although the patient strictly followed this plan, his teeth and gums, in the course of half a year, became again covered with an extremely thick coat of tartar. Berdmore was therefore under the necessity of recommending the use of a stiffer brush, and a dentifrice made of shells, for the purpose of removing the tartar. P. 56.

With respect to the treatment of tartareous incrustations of the teeth in general, it is essential to remove the tartar and clean the teeth well every day.

The internal and external remedies also, which are usually advised for dissolving stones in the bladder, may be employed, as lime-water, pure potassa, &c.

Sometimes peppermint-water, with a few drops of nitrous acid, is used with advantage.

3. Tartar from the porosity of the surface of the teeth. Persons who are in the habit of using acrid tinctures or powders which dissolve the enamel, and make it porous, are frequently troubled with tartareous incrustations.

The cause being avoided, the mode of treatment is the same as in the preceding cases.

*Of Blackness or Necrosis of the Teeth.*—This is a very peculiar affection of all the teeth, making them appear black, rough, and rod-d.

Sometimes only the upper part of the crown exhibits a dark-coloured rosion; while, in other instances, the whole substance of the tooth is eroded.

The proximate cause of this disease is imputed by Plenck to injury of the nutrient vessels of the pulp by disease, before

the growth of the tooth is thoroughly completed; and, therefore, it is a totally different disorder from necrosis of the bones, which is attended with phenomena, connected with the vascularity of the parts themselves.

Hence it is only in infants that several of the teeth are usually thus distempored.

Necrosis of the milk-teeth is indeed much more frequent than of the permanent set.

The following varieties of the complaint, depending on the difference of the cause, have been distinguished.

1. Blackness of the teeth from rachitis. In ricketty infants, the milk-teeth come out of the jaw more tardily, and they soon afterwards turn black and friable, and fall out piecemeal. The secondary teeth also, when rachitis is not cured between the first and second dentition, are affected with the same destructive change, so that subjects of this description are either destitute of teeth during the whole of their lives, or only have in their mouths teeth which have a black eroded appearance.

As for the cure of rachitis, we do not intend to consider it in the present place, and shall merely state that the pure milk of a healthy nurse, salubrious air, a great deal of exercise, good food, absorbent medicines, white alkaline salts, bark, steel, sea-bathing, &c. are the remedies principally recommended.

2. Scorbutic blackness of the teeth. When the scurvy attacks children before the ossification of the teeth is completed, the milk-teeth, as soon as cut, either appear to be already eroded, or in a short time afterwards become so, and put on a black colour.

The cure demands the immediate exhibition of anti-scorbutic medicines, with the assistance of which the second teeth are sometimes perfectly healthy.

3. Blackness of the teeth from the small-pox. In children who are seized with malignant small-pox during the first or second dentition, a black erosion of the teeth is frequently observed.

The cure requires the repeated administration of purgatives, and then the Peruvian bark.

4. Blackness of the teeth from measles. The same black erosion of the teeth has been remarked after severe cases of measles.

The cure is the same as in the foregoing instance.

All the preceding species of necrosis, when they affect the milk-teeth, are to be stopped by their proper specific remedies, in order that the second set of teeth may not be affected; but when these are disordered, the case is irremediable.

5. Blackness of the teeth from tartar. The tartar itself sometimes turns black, and even after its removal, the teeth often remain of a blackish colour, which cannot be effaced.

6. Blackness of the teeth from the application of mineral acids. Nitrous acid diluted with water, in a short time, whitens the teeth; but soon afterwards renders them black and friable. Plenck has seen the lateral edges of the teeth turned black and corroded by the employment of mercurial cosmetics.

7. Blackness of the teeth from cancer. Plenck has twice noticed in men, who were afflicted with ulcerated cancers of the lower lip, the teeth disfigured with a deep black colour. But it is to be remarked, that the affection was confined to the enamel, and did not extend to the bony substance of the fangs.

*Preternatural Colour of the Teeth.*—This is a change of the natural colour of the teeth to a yellow or ash-colour.

1. Discolouration from neglect to clean the teeth. The *fordes*,

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fordes, which collect upon the teeth, diminish their gloss and whiteness, and render them yellow or ash-coloured.

The cure consists in removing the fordes.

2. Discolouration from age. The whiteness and polish of the teeth, peculiar to youth, change in the advanced period of life into a dull yellow, which is totally irremediable.

3. Discolouration from the use of mercury. The teeth are discoloured not only by the internal, but also by the external use of mercury. Hence gilders, and other artizans who make use of mercury, have their teeth stained of a leaden colour. Plenck has seen the same sort of disfigurement occasioned by cosmetics containing quicksilver.

The cure requires that the mercury be got out of the system as expeditiously as possible.

4. Discolouration from scurvy, &c. Scorbutic persons are especially noticed as having the colour of the teeth spoiled. Venereal and ricketty subjects are also frequently affected in the same way.

To this head must likewise be referred the discolouration of the teeth observable in mariners.

5. Discolouration of the teeth from pregnancy. In pregnant and suckling women, the lustre of the teeth is often remarked to lessen, and these parts to be discoloured. Lorry, *Tract. de Morb. Cutaneis*, p. 61.

It is supposed that this change of the teeth is frequently connected with the bad state of the milk, the evacuation and correction of which are the means of cure advised by several authors.

6. Discolouration from taking hot food. Persons who make a practice of drinking very hot liquids, or of chewing substances which are too warm, have the lustre and whiteness of their teeth destroyed. It is questionable, whether the beautiful white colour of the teeth of animals in general may not be owing to their abstaining from hot aliments?

7. Discolouration from dentifrice powders and tinctures containing mineral acids. Thus, burnt alum and spirit of nitre for a short time whiten the teeth; but a little while afterwards, the enamel turns pale and falls off in bits.

8. Discolouration from the smoke of tobacco. The oil of this plant is well known to have the effect of turning the colour of the teeth to a dark brown or black.

9. Discolouration from thinness of the enamel. When the vitreous substance is in a certain degree worn away, the bony substance, which is yellow, can be seen through it. The defect is incurable.

10. Discolouration from an internal caries of the tooth. Such a tooth loses its lustre and whiteness, and becomes pale, ash-coloured, dark-brown, and at length black.

Here the only mode of cure is to extract the diseased tooth.

11. Discolouration from the use of madder. It is remarked, that only the bony part of the tooth is stained red by this root, but not the enamel. The redness also does not extend itself to the portion of the tooth already formed; but only to the part formed while the animal is fed with madder. This colour likewise never disappears: circumstances much against the doctrine of the teeth being vascular.

12. Golden discolouration of the teeth. This species is brought on by art.

*Fragility of the Teeth.*—In this affection, the cohesion of the substance of the teeth is so slight, that a very inconsiderable force makes it break.

The proximate cause of this fragility of the teeth is probably connected, in many examples, with some imperfections in their original growth.

The varieties described by writers are as follow:

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1. The scorbutic fragility. In people afflicted with the scurvy, the bodies of the teeth by degrees become so fragile that they drop out piecemeal.

2. Fragility from rickets. In children thus affected, the milk-teeth, soon after they have been cut, become dark-coloured, are easily broken, and usually fall out in pieces.

3. Fragility from old age. In old age the teeth are apt to be broken in biting with force, and to fall out piecemeal.

4. Fragility from the application of mineral acids or burning oils. The abuse of such medicines, too long continued, brings on a species of fragility, which admits of no mode of cure.

5. Fragility from caries. Teeth, which are excavated by caries, and rendered thin, are readily broken in mastication, and drop out in pieces.

All the different species of fragility are incurable.

*Mollities, or Preternatural Softness of the Teeth.*—This disease is so remarkable a softness of the substance of the teeth, that it can almost be compressed together by the fingers.

The proximate cause is said to be either too great a quantity of the gluten, which connects the earthy particles together, or else a deficiency of the earth.

The species are:

1. Softness of a milk-tooth. Plenck extracted from a girl seven years of age, a canine milk-tooth of the lower jaw, which was livid and soft, like cartilage, and was compressible by the fingers, especially at the fang. *De Morb. Dentium*, p. 39.

2. Softness of the teeth from sarcoctosis of the fang. Sometimes the fang of a tooth is absorbed, and a fungous substance fills up its place. This case has been absurdly instanced as a specimen of mollities of the teeth.

3. Softness of the teeth from scurvy. It is asserted, that in the scurvy, the teeth have been sometimes softened and enlarged. (*Grainger Hist. Febris Anom.* p. 6.) But such accounts must be incorrect, since they imply a vascular organization of the teeth. It merits attention also, that in certain dead subjects, whose bones are all affected with mollities, the teeth are found perfectly hard.

*Preternatural Angles, or Sharpness of the Teeth.*—Sometimes the form of a tooth is so acute, that it hurts the neighbouring parts by pricking them.

The effects of such a tooth are irritation of the tongue, or of the inner surface of the lips, or cheek. Hence inflammation of these parts, or an ill-conditioned ulcer opposite the sharp portion of the tooth, curable by no means whatsoever, except the removal of the angle or sharpness.

The species are ascribable to the particularity of the cause.

1. Irritating angles, or sharpness from malformation of a tooth. In this case the tooth has a found appearance, and the crown is felt to be too pointed or sharp.

2. Irritating angles, or sharpness from an oblique fracture of a tooth; as sometimes happens from biting hard nuts and other substances. The case can be detected on ocular examination.

3. Irritating angles, or sharpness from the tooth being worn obliquely. This is the most common case.

The cure requires that the pointed or sharp part of the tooth be removed either with a file or a pair of cutting forceps; but if this cannot be accomplished, the tooth should be pulled out.

*Fractures of the Teeth.*—A fracture of a tooth is a solution of it into two or more fragments.

The solution of continuity may be transverse, oblique, or comminuted. The most common kind of fracture is the separation of a particle of the enamel from the rest.

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The effects are, considerable pain in the tooth, and sometimes convulsions; an unpleasant sensation in the tongue upon its touching the fracture. An oblique fracture hurts the tongue, lips, or cheek, by its pointed form. The broken surface of a tooth not unfrequently becomes carious.

The species are:

1. Fracture from violence; as occurs in a fall upon the teeth, a blow on them, or in biting the hard stones of fruits, or in an imperfect extraction of a tooth.

2. Fracture from previous caries, or fragility of a tooth. When either of these causes is present, a very inconsiderable force will break the tooth, and split it into several pieces. The surface of the fractured part ought to be kept covered for several days with mastic.

The fracture of a tooth is an incurable accident.

*Fissures of the Teeth.*—A fissure of a tooth means a solution of continuity, like a mere line, or a crack in the enamel.

For the most part, the cause originates from biting the stones of fruit, or other hard substances.

The effects are pain and tenderness of the tooth, and, in consequence of the entrance of fordes into the fissure, caries is frequently produced.

The treatment consists in filling up the fissure, while recent, with gum mastic.

*Luxations of the Teeth.*—The luxation of a tooth means the displacement of it from its natural position in the socket, occasioned by violence.

The causes are biting hard or resisting bodies with extreme force; falls or blows upon the teeth; but, most commonly, the accident is brought on by an imperfect and unsuccessful attempt to draw a tooth.

The disfigurement, arising from the wrong posture of the tooth, is the chief effect. The tooth may be put into its right position again with the aid of a pair of forceps.

*Stupor of the Teeth.*—This is a very singular sensation in the teeth, which cannot be described by words. It was called by the Greeks *hamodia*, from *αἰμαδιὰ*, *obstupesco*: the French term it *l'agacement des dents*.

The proximate cause is a peculiar affection of the nerves of the teeth.

With regard to the effects, this annoying sensation prevents mastication, and excites a preternatural secretion of the saliva; while it is exasperated by the entrance of air into the cavity of the mouth. For the most part, the complaint is only of a transient nature.

The species are:

1. Stupor of the teeth from eating unripe fruit. Hence we find, the affection is often caused by eating four cherries, currants, gooseberries, &c.

This cure may be relieved by chewing sweet almonds, or applying fomentations to the teeth.

2. Stupor of the teeth from vomiting dark bilious matter from the stomach. The secretions thrown up from the stomach are sometimes of an austere acid kind, and therefore may give rise to this affection of the teeth. Plenck has many times noticed the occurrence in hypochondriacal subjects. *Doctrina de Morb. Dentium*, p. 42.

The cure demands emetics and absorbents, or mild alkaline remedies.

3. Stupor of the teeth in ricketty subjects. The teeth of persons who labour under rachitis, are, on account of their greater sensibility, particularly exposed to the attack of this complaint.

Besides the radical cure of rachitis, which is to be attempted by tonic and absorbent medicines, external palliative means are not to be omitted

4. Stupor of the teeth from harsh noises. Thus the pain-

ful sensation is brought on by the acute rough sound made by filing various substances, scraping slate, sawing stone, &c. In a fright, the gnashing of the teeth has been observed to have a similar effect.

*Odontalgia, or Tooth-ache.*—This signifies pain in one or more of the teeth; the etymology being *ὀδον*, *dens*, and *αλγω*, *dolco*.

The proximate cause is an irritation of the nerves which are distributed to the teeth and gums.

As for the effects, the pain in the teeth sometimes rises to such a degree, that restlessness, fever, delirium, spasms, convulsions, faintings, &c. are produced, especially in persons of irritable constitutions.

The cheek of the painful side very often swells upon a little abatement of the complaint taking place; the patient drivels considerably; and mastication cannot be performed without an increase of suffering.

The different species of the complaint are as follows:

1. *Odontalgia rheumatica*, or the tooth-ache occasioned by the rheumatism affecting the gums and teeth.

The symptoms of this case are, pain in the teeth, without any thing ailing the gums, as far as can be detected by ocular examination.

The cure demands purgative medicines, and afterwards sudorifics.

Externally, wine and water; or vinegar, in which the radix pyrethri has been boiled; the smoking of tobacco; sinapisms to the cheek; or blisters upon the temples, or nape of the neck; are esteemed amongst the most eligible means of relief.

2. *Odontalgia catarrhalis*. This case is mostly brought on by a cold damp atmosphere and the suppression of perspiration, or from sudden exposure to cold while the body is very much heated.

This species may be known by the presence of the usual symptoms of catarrh, the discharge of mucus from the nostrils, cough, &c.

It admits of relief by the same means which are proper for a catarrh, or the rheumatic species of tooth-ache.

3. *Odontalgia inflammatoria*. The complaint is brought on by inflammation of the gums. Such inflammation oftentimes affects, at the same time, all the neighbouring parts, as the cheeks, ears, eyes, and indeed sometimes the whole head.

Frequently the case brings on, in a slow manner, the formation of abscesses between the gums and cheek, which abscesses, after a great deal of violent pain, burst.

This tooth-ache is exasperated by every kind of warm medicine, whether given inwardly, or used as an external application.

The cure of the complaint in its early stage demands venesection, purgatives, nitre, and other antiphlogistic remedies.

Externally, there is no better application than the aqua plumbi superacetatis.

4. *Odontalgia arthritica*, or *odontagra*, arises on the abatement of a gouty affection of the joints, but subsides again as soon as the latter disease recommences.

5. *Odontalgia venerea*. Both the venereal disease itself, and the mercury which is administered for its cure, not unfrequently give rise to severe tooth-ache. In each of these cases, purgatives are indicated, and afterwards an emulsion of gum arabic, the warm bath, and the compound decoction of sarsaparilla.

Here drawing the teeth is said to be extremely dangerous, as it is apt to bring on inflammation of the throat, and even fatal consequences.

6. *Odontalgia scorbutica*. This case may be known by the

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the existence of the usual symptoms of the scurvy. In addition to an intolerable itching in the gums, very acute pain is also often experienced.

With respect to the cure, topical remedies must be employed, together with such external and internal medicines as are generally requisite for the scurvy.

7. *Odontalgia gastrica* is an acute pain in the teeth and gums, arising from a wrong state of the *primæ viæ*.

It may be cured by emetics, purgatives, and other medicines calculated to put the bowels and stomach into order again.

*Odontalgia gastrico-verminosa*. People who have worms are frequently tormented with the tooth-ache. Authors attempt to explain the fact as follows: they state that worms in the intestines irritate the great intercostal nerve, which has a strong sympathetic connection with the nerves of the teeth.

The cure demands purgatives and anthelmintic remedies.

8. *Odontalgia ventriculi debilitate, seu irritabilitate*. It sometimes happens that men and hysterical women, whose stomachs are weak and irritable, are afflicted with excruciating tooth-aches, which yield to no remedies but antispasmodics, stomachics, and tonics.

9. *Odontalgia gravidarum*. In the tooth-ache originating from pregnancy, the pain often shifts from one tooth to another, and comes on very repeatedly, although the teeth are frequently perfectly sound. Sometimes the pain is merely sympathetic; but, in most instances, it is connected with that plethoric state of the female constitution known to prevail during pregnancy. Venesection is, therefore, the chief means of relief, and then topical applications may be used.

It is a question, whether the operation of drawing a tooth should ever be performed on pregnant women. There are some women who have such a dread of the instruments for this purpose, that the very sight of them brings on the danger of convulsions and a miscarriage. But, on the other hand, the pain may be so violent as to create a chance of the same evils. Here much address is requisite to persuade the patient to undergo the operation, and at the same time great prudence not to advise it, unless rendered absolutely indispensable by the severity and obstinacy of the pain.

10. *Odontalgia nutricum*. Women who suckle are also particularly subject to be afflicted with excruciating tooth-ache, whether the teeth be sound or carious. When the pain resists the usual means, especially opium and venesection, the tooth must be extracted. This case has been supposed to depend upon a certain sympathy between the *mammæ* and the teeth.

11. *Odontalgia* from cutting the *dens sapientiæ*. Sometimes great and long-continued pain, delirium, and other alarming symptoms take place, until the tooth has made its way out, or the gums have been divided.

12. *Odontalgia hysterica*. This species of tooth-ache often affects hysterical women a long while, notwithstanding the teeth may be perfectly healthy; nor does it always yield to opium, nor even to the operation of extracting several of the painful teeth.

The treatment requires the warm bath, emollient fomentations to the cheeks, and gargles of the same quality to the mouth.

13. *Odontalgia* from the teeth being worn away. The bony substance of the teeth is so sensible, when deprived of the enamel, that on coming into contact with air, or food, at all too warm, or cold, the most intolerable pain is excited.

14. *Odontalgia* from tartar on the teeth. The tartar separates the gums from the neck and fang of the tooth, so as to expose the latter parts to the cold air, and the stimulating quality of the food. Hence, it is obvious, pain must be the consequence.

The radical cure can only be accomplished by removing the tartar. The complaint may be palliated by the common applications for the relief of tooth-ache.

15. *Odontalgia* from a fracture of the body of the tooth. In this case the nerves of the remaining portion of the tooth are exposed to the air, and sometimes become affected with extreme pain.

Writers recommend for the purpose of relieving this complaint, either applying the cautery to the surface of the fractured tooth, or else covering it with wax, or gum mastic.

16. *Odontalgia verminosa*. Whether the tooth-ache can ever really arise from the presence of worms in a carious tooth, is doubtful. Plenck conceives the occurrence possible, and he proposes as a means of cure the employment of a gargle containing the muriates of ammonia and soda.

17. *Odontalgia periodica* signifies that form of the tooth-ache, which comes on every other day, and resembles in its periods of attack an intermittent fever.

In the treatment, authors recommend the use of purgatives, emetics, and the Peruvian bark.

18. *Odontalgia cariosa*. It is not every sort of caries of the teeth which is accompanied with pain; but only the internal or external humid kind of caries. In the dry caries, and also in the humid, when all the nervous filaments of the bone of the tooth have been destroyed by it, the carious tooth remains free from pain.

In the tooth-ache from caries, the following modes of relief are recommended:

1. Pressure upon the nerve which comes out of the infra-orbital canal of the superior maxillary bone.

2. Pressure upon the nerve which passes out of the *canalis mentalis* of the lower jaw-bone.

3. Sulphuric acid applied to the carious part of the tooth by means of a probe. Plenck has sometimes found this plan useful.

4. *Vinum pyrethri*, vel *rutæ*, or strong vinegar.

5. Sinapisms to the cheek.

6. Blisters to the nape of the neck, and behind the ears.

7. The application of a magnet to the painful tooth.

8. Oil of cloves introduced into the carious tooth.

9. Camphorated milk retained for a time in the mouth.

10. Burning the nerve with a heated probe.

11. Opium applied to the carious tooth, or administered internally.

12. Luxating the painful tooth is another mode of relief which has been proposed. With the aid of a suitable instrument the tooth is to be turned a little round in its socket, and then turned back again into its natural position. Thus, the small nerve, which enters the hole in the fang, is either broken or rendered paralytic.

*Caries of the Teeth*.—This signifies an erosion of the substance of the teeth.

The *dentes molares* are more frequently than the rest of the teeth affected with caries, and the *dentes sapientiæ* oftener than any of the other grinders.

Caries of the teeth varies in respect to its situation, figure, nature, and cause.

In regard to situation, the caries may take place in one, in several, or in all the teeth. It may occur upon the ex-

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ternal or internal surface of a tooth; upon the body or the fang of a tooth; or it may affect every part of it.

As to causes, the caries may proceed from such as are properly called external, as a fissure; a wearing away of the enamel; fordes adhering to the teeth; tartar; a detachment of the gums; a violent effort to bite, by which the apex of the fang, or the bottom of the socket, is contused; the use of mercury; cosmetics; the application of acids, especially those which are termed mineral; dentifrice powders containing alum; cold damp air; smoking, or chewing tobacco, &c.

Sugar has been imagined to be hurtful to the teeth; but probably without real foundation. General de Beaufort ate every day for forty years a pound of sugar, and lived to the age of seventy. After death, his viscera were found free from disease, and his teeth sound. (Anecdotes de Médecine, tom. ii. p. 35.) Plenck put a healthy tooth into some syrup diluted with water, and kept it there two months, at the end of which time it was taken out, and found to have undergone no change. Doctrinâ de Morb. Dentium, p. 52.

The internal causes are scurvy, rachitis, serofula, &c.

In relation to the particular nature of caries of the teeth, there are two species; one termed humid, which quickly destroys the tooth affected with it; the other is the dry caries, which advances slowly, lasts a long while, is altogether indolent, and cannot be palliated by any known remedy.

The effects of caries are fetor of the breath; repeated attacks of tooth-ache; infection of the neighbouring teeth; and not unfrequently the corresponding tooth on the opposite side of the mouth becomes also affected with caries, as several authors whimsically suppose, from nervous sympathy. In the situation of the diseased tooth, especially, over the carious fang, the gum is most commonly attacked with a parulis, or epulis. Sometimes chronic ophthalmia originates from the irritation of the diseased fang (Journ. de Méd. tom. xxxvi.); or else a fistula of the gums or cheek, or an ozæna of the antrum Highmorianum. Even a locked-jaw has been known to arise from carious teeth. Truka Com. de Tetano, p. 151.

In respect to figure or form, the following species of caries may be established.

1. Caries foraminosa, or a carious canal, which runs from the external surface of the crown, and penetrates the substance of the tooth.

In the treatment, it is proper to clean out the carious canal with a needle, and by injecting a fluid into it. Then it is to be burnt with a heated needle; and, lastly, elosed with wax, mastich, gold, or lead.

2. Caries of the whole crown or body of a tooth. When the middle of the crown of a tooth is eroded in such a manner, that the caries is wider superficially than it is more deeply, then the gold, or lead, or whatever is used for filling it up, cannot be retained in its place.

In this circumstance it becomes necessary to burn the carious surface with a suitable instrument; or to destroy it with caustic applications; or to apply antiseptics.

But when, notwithstanding all these means, the caries yet spreads, the tooth ought to be extracted, in order to remove the pain, prevent the occurrence of other diseases, and not incur the risk of the tooth breaking in pieces in the attempt to take it out at a later period, when it may be excavated and rendered too thin.

3. Caries maculosa. If the superficial spot only appear upon the external surface of the tooth, it may be removed with a file.

4. Caries striata. When the caries occurs in the form

of a longitudinal black streak, it is either in the middle of the crown, or on the lateral margins of the tooth. This case may be occasioned by the teeth being placed too closely together, and also by the use of cosmetics. It admits of being taken off with a file.

5. Caries of the fang of a tooth. The body of such a tooth is sometimes found. The tooth, however, is frequently painful, the cheek of the affected side, and the gum near the painful tooth swell, and an abscess is formed, which is less common in the other species of caries.

The cure requires that the tooth should be drawn out as soon as the inflammation has subsided. It is reckoned dangerous to perform the operation while the parts are much inflamed.

6. Internal caries of a tooth. In this complaint the tooth is painful, and exhibits a leaden colour, and if it be shaken with an instrument the pain is considerably exasperated. Thus the diseased tooth may be detected amongst many which are healthy, even when several of them are thought by the patient to be unsound.

The cure requires the tooth to be extracted.

7. Caries of all the teeth. This affliction is sometimes induced by the scurvy, and rachitis. The radical cure is of course impossible; but the progress of the caries can be checked by the internal use of antiscorbutic medicines, the remedies against rachitis, and by giving assa-fœtida.

Externally, antiseptic washes may be useful.

*Plumbatio dentis* is the filling of the carious cavity with thin sheet-lead, tin, or gold. Gold is preferable to lead, which is apt to be acted upon and dissolved by acid food, and may therefore produce the saturnine colic; but, on the other hand, lead is more easily introduced into the tooth, and it can be more firmly fixed there. Some dentists give the preference to tin.

The operation is proper, if the carious tooth has a narrow entrance. It can only be performed on the incisors, canine teeth, and first grinders, which are furnished with but one fang.

The operation is contraindicated, when the orifice of the caries is wider than its bottom, as the lead cannot then be retained. Also, when pain and inflammation are present, the introduction of the lead must be deferred until these symptoms have subsided.

The instruments for this operation are,

1. The introducer.
2. The perforator.
3. The planatorium.
4. The file.

5. The plates or leaves of gold, about three or four times as thick as those commonly met with.

As for the operation itself,

1. A thin plate of lead, tin, or gold, is to be put into the hollow of the tooth, by means of the instrument called the introducer.

2. The lead or gold is to be gradually compressed more and more closely, so that it may fill up well the sides of the cavity. This is to be done with the planatorium. Then some holes are to be drilled in the metal with the perforator, and these are to be filled with lead. Lastly, the place is to be rendered even and smooth with the file.

The lead, for some days after the operation, proves rather disagreeable to the tongue; but, in a short time, the patient is habituated to it, and he experiences no longer any such inconvenience.

Sometimes pain and inflammation follow; in which case, the lead must be taken out for a few days with a pointed instrument.

## TEETH.

There have been persons who have had lead in their teeth seventy years, and upwards, without any annoyance from it.

*Of drawing or extracting a Tooth.*—We shall conclude this article with a few observations upon the surgical operation of extracting a tooth from its socket.

The following cases make the performance of it necessary.

1. A carious tooth, producing a severe degree of pain, which can be abated by no remedies.

2. A sharp tooth, which irritates and hurts the tongue, and does not admit of being amended with the file.

3. An ulcer, or abscess of the maxillary sinus.

4. A tooth which renders the socket carious, or causes abscesses, or excrescences of the gums, fistulæ of the jaw, or some other troublesome complaints.

5. A milk-tooth not being shed at the usual period, and its presence forcing one of the permanent set to grow in a wrong direction.

6. A tooth growing out of the palate, or in any other unnatural place.

On the other hand, the operation is contraindicated, when the gums are highly inflamed; or when a tooth-ache, excited by mercury, or the scurvy, is present. Drawing a tooth, in these circumstances, might give rise to extensive inflammation and angina in a dangerous degree.

The common instruments are,

1. The odontagra.

2. The pelicanus.

3. The clavis, or key.

These three instruments are objectionable in one respect: namely, they pull the tooth out of its socket obliquely; and hence they often break the alveolar process, or the tooth itself.

4. But the tooth-instrument which Aitken has described, draws the tooth out of the socket perpendicularly; and, on this account, has an advantage. See *Essays on several important Subjects in Surgery*, London, 1771, p. 196.

5. The tooth forceps.

6. The pes caprinus, or punch.

The molares, when they can be firmly taken hold of, may be extracted with either of the first four instruments.

The incisores, canini, and first molares, may be drawn out with the forceps.

Stumps and fangs cannot be taken hold of with these instruments; they must, therefore, be pushed out of the alveolar process with the pes caprinus, or punch, and then be removed with a pair of forceps.

The patient and surgeon are to place themselves as follows.

1. If the tooth be in the upper jaw, and it is to be taken out with the odontagra, pelicanus, or punch; or if the tooth, which is to be drawn, is in the lower jaw, the patient must be seated in a low chair, or on the ground, the surgeon standing behind him.

2. But if the tooth is to be taken out with the key, or from the upper jaw with the forceps, the patient is to sit in a common chair, and the surgeon is to stand in front of him.

The following are the different methods of performing the operation.

1. Of extracting a tooth with the odontagra.

The inner gum of the tooth about to be drawn, is to be depressed with the claw of the instrument nearly down to the alveolar process. The other part of the instrument is to be applied to the crown of the tooth.

While the thumb is employed in making firm pressure

upon the claw, the handle is to be held with the fingers, and, under the direction of the palm, the tooth is to be raised perpendicularly from its socket.

By means of the screw, which admits of being turned, the instrument may readily be adapted to the larger teeth.

2. Of drawing a tooth with the key.

The key is applied to the tooth nearly in the same way as the odontagra, except that the thumb of the other hand is placed upon the claw. At the commencement, the key is to be turned very gradually; and the tooth, when it yields, is to be cautiously and slowly raised, lest it slip away, and remain adherent to the gum.

3. Of drawing a tooth with the pelicanus.

The claw of this instrument is to be applied to the inside of the neck of the tooth, while the rotula is to be put upon the two neighbouring teeth. The thumb of the hand not holding the instrument is to be applied to the inside of them, so as to counteract the resistance of the rotula.

4. Of the extraction of a tooth with the forceps.

The neck of the tooth being firmly grasped with the forceps, is to be gradually moved, until it is sufficiently loosened to admit of being taken out perpendicularly.

5. Of taking out a tooth with the pes caprinus, or punch.

The two points of the instrument are to be firmly applied, under the gum, to the lower part of the neck of the remaining portion of the tooth. The thumb of the hand not thus employed is to be covered with some linen, and applied internally. The fang is then to be pushed out of the socket, and removed with a pair of forceps.

With regard to the symptoms arising after the operation: a slight hæmorrhage, and a swelling of the gums and cheek, are the usual consequences. These, however, are free from danger, and, when the mouth is washed with a gargle of tepid vinegar, they are soon relieved.

The more serious consequences, which sometimes occur after the extraction of a tooth, are,

1. A violent and dangerous degree of hæmorrhage.

2. Alarming inflammation of the gums and cheek.

3. Abscesses of the gums; very apt to take place, when the gums have been considerably bruised by the instrument, or when splinters of bone are left behind.

4. A fracture of the alveolar process, or of the palate. This accident is most liable to happen, when the fangs of the teeth diverge, or when the fang and socket have grown together by the process of ossification. The existence of the last case may be known by the neck of the tooth being curved. Here the tooth should always be drawn out towards its concave side.

5. Dislocation of the jaw. This may occur, if the mouth be too much open, or the lower jaw be brought too much forward, in the operation. The luxation ought to be immediately reduced. See LUXATION.

6. Fracture of the jaw. See FRACTURE.

7. Caries of the socket.

8. Lastly, fracture and luxation of the tooth may be the consequences of an unsuccessful attempt to perform the operation.

In the preceding remarks, we have been chiefly assisted by Plenck's excellent compendium, entitled "*Doctrina de Morbis Dentium*," &c. Lovanii, 1796.

Some interesting observations on the diseases of the teeth, particularly with a view to the question whether these parts are vascular, will be found in the article CRANIUM.

For a description of the diseases of the gums, we refer to GUMS, *Diseases of*.

## TEETH.

A Danish physician, named Hagerup, maintains in certain theses that one may hear with the teeth.

As to animals, there are some fishes which have teeth on their tongues, as trouts; others have them at the bottom of the gullet, as the cod-fish; some, as the great sea-dog or shark, called *canis carbarias*, have three, four, or five rows of teeth on the same jaw; the crocodile three, and those all incisors; vipers have two large crooked canine teeth, which are moveable, and ordinarily lie flat, only being raised when they would bite; and the rana piscatrix, sea-frog, or sea-devil, has whole rows of the like moveable teeth. The toad and cuttle-fish have no teeth, and yet they can bite. See *Anatomy of Fish*.

**TEETH, Chemical Analysis of.** The teeth closely resemble bone in their composition. The bodies consist of a cartilaginous basis, united with phosphate of lime, and small proportions of other earthy salts. The enamel differs so far only from the bodies, that it contains no cartilaginous matter, but consists entirely of earthy substances. The teeth have been often examined, and with various results, according to the state of chemical knowledge at the period of examination. We do not think it necessary to give an account of all that has been said on the subject, but shall confine our attention principally to the latest and most perfect analyses. We shall begin with the analysis of Mr. Pepys: he found the enamel of teeth composed of

Phosphate of lime	-	-	-	78
Carbonate of lime	-	-	-	6
Lofs and water	-	-	-	16
				100

The bodies of the teeth, according to the same chemist, consist of the following proportions.

	Roots of the Teeth.	Teeth of Adults.	First Teeth of Children.
Phosphate of lime	58	64	62
Carbonate of lime	4	6	6
Cartilage	28	20	20
Lofs	10	10	12
100			

A much more complete analysis, however, of the enamel of teeth has lately been made by Berzelius. He gives the following table of his results, compared with the composition of the bones of the same animals.

	Dried Human Bones.	Enamel of Human Teeth.	Bones of Oxen.	Enamel of Ox Teeth.
Cartilage	32.17	—	} 33.30	} 3.56
Blood-vessels	1.13	—		
Fluate of lime	2.00	3.2	2.50	4.00
Phosphate of lime	51.04	85.3	55.85	81.00
Carbonate of lime	11.30	8.0	3.85	7.10
Phosphate of mag- nesia	} 1.16	} 1.5	} 2.05	} 3.00
Soda, muriate of soda, water, &c.				
	1.20	2.0	2.45	1.34
100				100

Thus confirming a discovery made many years before by Morichini, an Italian chemist, namely, that the enamel of teeth contains fluoric acid; a circumstance which had been called in question by later inquirers.

*Fossil Ivory* and bone have been found by Fourcroy and Vauquelin to retain proportions of animal matter, varying from 45 to 15 per cent.; a curious fact, and highly illustrative of the powers of intimate mixture, or rather perhaps chemical union, in preventing the destruction of organic substances.

**TEETH, Artificial,** are those set in lieu of natural ones, which are wanting. See *TEETH, Diseases of*.

**TEETH, Mark of,** in the *Manege*. See *MARK and EYE of a Bean*. See also *TEETH, infra*.

**TEETH of Fish.** See *Anatomy of Fish*.

**TEETH, in Rural Economy,** little bones fixed in the jaws, which serve not only to reduce the food and nourishment, but shew the age in some animals. The horse has forty teeth, including the tushes, which are thus distinguished. Twenty-four are called *grinders*, being placed at the bottom of the mouth, beyond the bars, twelve on each side of the channel, viz. six above, and six on each side. These teeth continue, and do not give place to new teeth in their room, so that they are of no use in distinguishing a horse's age; and they are subject to wolves teeth. In regard to the other sixteen, twelve of them are called in their infancy *milk* or *foal* teeth, and the remaining four go by the name of *tushes*. The twelve foal teeth are short, small, and white, and are seated on the fore-part of the mouth, six above, and six below; and these change and cast, to give place to others; which, in process of time, become long, large, and yellowish.

These new teeth are distinguished by different names given them, according to their putting forth; and it is the manner of their coming forth that gives the knowledge of the first years of a horse's age.

Of these twelve, four are called *nippers*, four *middling* teeth, and four go by the name of *corner* teeth. The four nippers are seated on the fore-part of the mouth, two above, and two below. When a horse has put forth these, he is concluded to be from two and a half to three years old.

The middling teeth are placed near the nippers or gatherers, one above, and one below, on each side of the jaws. They come out and appear between three and a half and four years.

The corner teeth are placed still more forward in the mouth, one above, and one below, on each side of the jaws.

They begin to shoot between the fourth and the fifth year, and are got above the gum at five years; and when surmounting the gum at that age, they become hollow, and mark commonly till seven or eight years. By marking is meant, that in the hollow or cavity of the corner teeth a little black speck is formed, which, from its resemblance, is called the bud or eye of a bean, or the mark. But when the horse passes six, the cavity begins to fill, and the black mark disappears by degrees; yet this diminution of the cavity and the mark continues from six to seven and a half. However, at eight years, the cavity is filled up, and the black mark gone; and the tooth is then full, and even as if it had been shaved. It is then said, that the horse has *raised*, which happens a little before the eighth year; and after that, the horse does not mark; so that the surest knowledge of his age is then formed from his tushes.

The tushes are placed beyond the corner teeth, upon the bars, two on each side below, without being preceded by any foal teeth. The two under tushes cut sometimes at three years, sometimes at three and a half, sometimes at four;

four; but the two upper tushes sometimes at four, sometimes at four and a half; sometimes before and sometimes after the corner teeth, without any certain rule; and till the age of six they are chamfered within. And at about ten years of age the two under tushes appear much worn, which serves for that age. After that they grow out in length, and become bare of flesh, because the gum shrinks and retires; and at last, about the fifteenth or sixteenth year, the horse *shells*.

It is sometimes said, that a horse is not capable of any great fatigue till his tushes have cut the skin. See AGE, in *Horsemanship*.

The teeth in sheep are divided into two kinds, the *incisores* and the *molars*, or the cutting and dividing, and the rubbing and grinding teeth. Such sheep as are full-mouthed have eight of the first sort of teeth; throwing up two every year, consequently lose their sucking teeth. The *incisores* are found to wear down in proportion to the action which they have; but the *molars*, having more strength, and a different form, do not suffer so much in this way.

It has been suggested by an experienced sheep-farmer, that these sorts of young animals mostly renew their first two teeth at from about fourteen to sixteen months of age; and after that, every year nearly at the same time, until they are turned three years old, or, in the technical language of the sheep-master, three shear, when they become full-mouthed; for although they have eight teeth before in the under jaw, it is commonly believed that they only cast and renew the six inside ones. Shepherds, however, differ much on this point, some contending that they only shed the six fore-teeth, while others maintain that they cast the whole eight fore-teeth. The matter is, therefore, not yet well ascertained. Some properly remark, that sheep are very uncertain in their throwing up their teeth; much depending upon their being early or late lambed, well or ill fed, and other similar circumstances. Tups have been known to have four broad or renewed teeth, when by the age, as shewn in the above manner, they ought to have had only two. Some sheep are remarked to be more backward than others, by several months, in proportion to their strength of constitution, and other matters.

In Romney Marsh the teeth of sheep are found to decay much faster, it is believed, than in any other part of the country. Close feeding wears the teeth exceedingly; of course, the teeth of the sheep of those who flock the hardest commonly decay the soonest. The sheep graziers in this district are very particular in mousing their sheep, which are kept or rejected according as their mouths are found to be good or bad; as, where the latter is the case, they have great difficulty in maintaining themselves during the winter season.

It is noticed that sheep, about the time of renewing their teeth, are very tender in their mouths, and do not thrive so well as they do at other seasons. At one season a teg, it is supposed, may starve any sheep by close feeding; but on the renewal of its broad teeth, any sheep may starve it.

In the above district, the barrens or old breeding ewes are generally cast off when they have had their third lamb; though sometimes, if their mouths be good, and they are often better than those that have had only one lamb, they are kept for the fourth lamb: nor is this supposed a bad practice, since by it some valuable ewes may be reserved.

Sheep are seldom kept here to any great age: some favourites are, however, kept till ten years old, without a tooth in their heads. Some have heard of their living twenty years. In the county of Hereford they are said to live to a great age: they live on long grafs in the summer season, and

pease-straw and other similar matters in the winter, which do not wear their teeth so much as when they labour hard on a close short-set turf. See SHEEP.

The teeth of the various other sorts of domestic animals have hitherto been but little noticed or attended to by store or flock masters, though they are probably, in many cases, as much changed, and serve to mark the ages and growths of the animals as much and as certainly, as in the instances and cases which have been given above.

TEETH, *Mammoth's*. See MAMMOTH'S *Teeth*.

TEETH, *Wolf's*. See WOLVES' *Teeth*.

TEETH of a *Wheel*, in *Mechanics*. See WHEEL.

TEETHING. See DENTITION, and *Diseases of TEETH*, *supra*.

TEETMOW, in *Geography*, a town of Bengal: 40 miles S.S.E. of Curruckpour.

TEFEE, a town of Brasil, in the government of Para, on the river of the Amazons; 220 miles W. of Fort Rio Negro.

TEFELSDORF, a town of Transylvania; 7 miles N. of Schefburg.

TEFEN, a town of Asiatic Turkey, in Natolia; 28 miles S.W. of Amasieh.

TEFESSAD, or TFESSAD, a town of Algiers, whose ruins extend along the coast of the Mediterranean near a league, supposed to have been the ancient Tipasa; 32 miles S.S.W. of Algiers. N. lat. 36° 32'. E. long. 2° 54'.

TEFETHNE, or TEFTANE, a town of Morocco, on the coast; 60 miles W. of Morocco.—Also, a river of Morocco, which runs into the sea near Mogodor.

TEFFEREG, a town of the archbishopric of Salzburg; 1 mile S. of Windisch Matray.

TEFLIS, a town of Asia, capital of the principality of Georgia, and see of a bishop, founded, according to an old inscription in the citadel, by a certain prince Sarang, A.D. 1063, is situated on the N.W. side of the great plain of Karajoes, at the foot of a hill, occupying both banks of the river Kur, over which is a bridge. This city is surrounded with strong walls, except towards the river; and has a large fortress at the declivity of the mountain, which contains a garrison, and is often made use of as a place of refuge for criminals and debtors. All the houses are of stone, with flat roofs, which serve, according to the custom of the East, as walks for the women. The buildings are neat and clean; but the streets are exceedingly dirty and narrow. The town contains one Roman Catholic, thirteen Greek, and seven Armenian churches. Near it are some warm springs, and hence it is called Theleftokar, or Warm town. In the year 1386, this town was taken by Tamerlane, and the king of Georgia made prisoner. In 1723 it was taken by the Turks; and in 1734 retaken by Kouli Khan. Before it was taken by Aga Mahomed Khan, in 1797, it contained 4000 houses, and 22,000 inhabitants. Although most of the houses, which are neatly built, are now standing, the population does not exceed 15,000 souls. It was for many years the residence of prince Heraclius, and is at present that of the Russian governor and commander-in-chief, who has at all times a large force stationed in the city, to the disgust of the inhabitants, who shudder at the thoughts of their wives and daughters being constantly exposed to the view and importunities of strangers. This circumstance tends to render the Russian name detested by the Georgians: 100 miles N.N.E. of Erivan. N. lat. 42° 45'. E. long. 45° 20'.

TEFTERDAR, the name of an officer of dignity in the Eastern nations. In Egypt he is lord high treasurer of the tribute paid out of the lands to the grand signior. He is named  
for

for a year by the Porte, but is generally continued in his office many years. This office is sometimes given to one of the poorer beys, to help him to support his dignity; and frequently to a quiet one, who is not likely to enter into intrigues. For one party never cares that a stirring man of the opposite party should be invested with an office of this dignity. See DEPTARDAR.

TEFUT, in *Geography*, a town of Africa, in the country of Darah, formerly the capital of the ancient kings of Darah, now gone to decay.

TEFZA, a town of Morocco, built by the Arabians on the side of a mountain: the surrounding walls are composed of blocks of marble; 70 miles N.E. of Morocco. N. lat.  $31^{\circ} 40'$ .

TEFZRA, a town of Algiers; 15 miles S. of Tremecen.

TEG, a term used in some parts of the kingdom by the farmers, to express a lamb of a year old. Among sportsmen it denotes a roe of two years old. When a flock of ewes and lambs are turned into a turnip-field, the young lambs of three weeks old will immediately fall to eating the turnips, and scoop them very prettily; but these tegs will not touch them for several days. They usually stay till almost starved to death before they begin, but when they have begun, they soon grow fat.

In the Romney Marsh system of management, both the ewe and the wether tegs are kept upon the upland grass farms during the winter season, by which advantages are gained in various ways. They are by this means enabled to keep more ewes and fattening sheep on their marsh-lands, and to have the tegs when the pastures require them. See SHEEP.

TEGADOO BAY, in *Geography*, a bay on the east coast of the most northern islands of New Zealand, discovered by captain, then lieutenant Cook, in 1769. S. lat.  $38^{\circ} 10'$ . W. long.  $181^{\circ} 14'$ .

TEGÆA, JIMMEL, in *Ancient Geography*, a town of Africa, mentioned by Hirtius, situated S.W. of Leptis.

TEGANAN, an island of the Mediterranean, in the vicinity of that of Rhodes.

TEGAPATAM, in *Geography*. See FORT St. David.

TEGAREE, a town of Bengal; 11 miles N. of Kishenagur.

TEGAZA, a town of Africa, capital of a district in Zenhaga; near it is a salt-mine, about 300 miles from the Atlantic, and 400 S. of Cape Non. N. lat.  $22^{\circ} 20'$ .

TEGE, in *Ancient Geography*, a town of Africa Propria, between the two Syrtes. Ptol.

TEGEA, a town in the S.E. part of Arcadia, at a small distance from the Argolide; and placed by M. D'Anville on the site of the modern Moklia. In this place was a famous temple of Minerva Alea, in which was a statue of the goddess, which was removed to Rome by Augustus. This temple contained a number of other curiosities; and the priesthood in it was exercised by a young female under fifteen years of age. Near this temple was a stadium, in which were celebrated games in honour of Minerva, and others in memory of a victory gained over the Lacedæmonians. The public place was ornamented with statues, and particularly one of Mars Gynecotheone, ( $\gamma\upsilon\gamma\eta\kappa\omicron\theta\epsilon\omicron\upsilon\iota$ ) sculptured upon a column. The epithet served to maintain the remembrance of a victory obtained by the valour of the females of Tegea. At a small distance from the public place was a magnificent theatre, encompassed with bronze statues. This city suffered much in the wars which raged in Arcadia in the time of the Achæan league. Pausanias says that here was a temple of Venus Urania, near that which was dedicated to Ceres

and Proserpine. The Tegeates were a valiant people. Herodotus (l. i. c. 61.) mentions them with commendation. The Lacedæmonians ravaged the territory of Tegea, and at length obtained a superiority over its inhabitants.

TEGEA, a town of the isle of Crete, said to have been inhabited by Agamemnon.—Also, a town of Macedonia.

TEGEHET, or TEGEGILT, in *Geography*, a town of Africa; 120 miles S.S.W. of Fez.

TEGEL, ERIC, in *Biography*, a Swedish historian, and principal secretary to Eric XIV. His father, having incurred the just resentment of Eric, as the cause of the misfortunes that occurred during his reign, was apprehended by Charles, duke of Sudermania the brother of Eric, and put to death at Stockholm in 1568. Charles, however, took the son under his protection, and sent him to Germany for improvement; and when he had visited Spain and Poland, appointed him his secretary. In 1614 he was nominated by Gustavus Adolphus historiographer of the kingdom, and in 1617 a privy-counsellor. He died at Stockholm in 1636, and left several works, of which the following were printed in Swedish: *viz.* "The History of Gustavus I. in two Parts." Stockholm, 1622, fol. "The History of Eric XIV. with Stiernman's Remarks;" 16-1721, 4to.

TEGENUM, or TEGIANUM, in *Ancient Geography*, a town of Lucania.

TEGERHY, or TEIGAREA, in *Geography*, a town of Africa, in the country of Fezzan; 80 miles S.W. of Mourzouk. It is a small town, and collects from its lands little produce besides dates and Indian corn. N. lat.  $26^{\circ} 17'$ . E. long.  $15^{\circ} 5'$ .

TEGERN, a town of Bavaria, on a lake called the Tegern See, anciently Lacus Tigurinus. Here is a celebrated abbey, founded by Albert and Ockar, two Bavarian princes; 28 miles S.S.E. of Munich.

TEGESSUS, in *Ancient Geography*, a town of the island of Cyprus.

TEGEWSE, in *Geography*, a town of Africa, near the lake of Marks, anciently called Tichafa; 38 miles S.S.W. of Gafsa.

TEGHURI, a large river of Mingrelia, which rises between the Alani and Soanni hills, and disembogues into the Phasis, 10 versts above the Scharistkali.

TEGIANUM, in *Ancient Geography*, a town of Italy, in Campania, according to Cluvier; though others assign it to Lucania, and call it Tegenum.

TEGIUM, a town of Asia Minor, in the Troade.

TEGLA, in *Geography*. See TUGGALA.

TEGLIO, a town of Italy, in the Valteline, situated upon the top of a mountain, is a long straggling place, containing about 300 houses, about 9 miles from Tirano, and 12 from Sondrio. Close to the town are the ruins of a fortress, standing upon an insulated rock, and formerly esteemed of great strength. This elevated spot commands a rich and extensive prospect from Tirano to the lower part of the valley, beyond Sondrio, as far as Morbegno. The government of Teglione is said to contain the 12th part of the Valteline; it is the most populous district, and contains about 8000 souls. In a good season, it produces much more corn than is sufficient for the consumption of the inhabitants, and rivals Sondrio and Tirano in the goodness of its wine.

TEGNA, in *Ancient Geography*, a town of Gaul, on the banks of the Rhone, not far from Valentia, to the north; the modern Tein.

TEGOMA, in *Geography*, a town of Africa, in the country of Afoudan; 50 miles S. of Agades. N. lat.  $19^{\circ} 10'$ . E. long.  $12^{\circ} 20'$ .

TEGORARIN, a town of Africa, in Biledulgerid; 70 miles N.N.W. of Gardeiah.

TEGUCO, a town of New Mexico, in the province of Culiacan; 40 miles N. of Culiacan.

TEGUIXIN, in *Zoology*, a species of lizard; which see.

TEGULA, in *Ancient Geography*, a town of Sardinia, on the route from Sulci to Nora. Anton. Itin.

TEGULET, in *Geography*, a town of Abyssinia; 180 miles S. of Gondar. N. lat.  $9^{\circ} 54'$ . E. long.  $38^{\circ} 35'$ .

TEGUMENT. See INTEGUMENT,

TEGYRA, in *Ancient Geography*, a town of Greece, in Bœtica.

TEHAE', in *Geography*, a town of Curdistan; 30 miles E. of Amadih.

TEHAMA, a sandy belt which encompasses the peninsula of Arabia, beginning at Suez, and terminating at the mouth of the Euphrates. It is of various breadth; for the most part about two days' journey from the sea-shore to the rise of the hills; or at least this is the breadth of the plain adjacent to the Red sea. It bears every mark of having been anciently a part of the bed of the sea. Its bottom soil is a greyish clay, with a large proportion of sand, and having marine exuvia interspersed to a great distance from the sea-shore. It contains large strata of salt, which in some places rise up to hills. Its regular inclination towards the sea indicates that it has emerged gradually. The small eminences on the confines of this plain are composed of calcareous stones, with a blackish appearance, as if they had been burnt by the sun. The adjoining hills contain schistus and basalt. The sea, it is thought, still continues to recede, and the Tehama on that side is gradually extending its limits. History confirms these appearances of the gradual recession of the waters; and mentions, as sea-ports, several places which are at present inland, without noticing the present maritime towns, which must have been of later origin than the formation of the land on which they stand. These newly-formed lands, however, are barren and unfruitful.

TEHRAUN, one of the five large districts of the province of Irak, in the Persian empire: the other four being Ispahan, Naen, Mullayer, and Kermanshaw. Tehraun is also the name of the present capital of Persia, which is rendered interesting by the surrounding scenery. To the S. are the extensive ruins of the grand and once proud city of Rae; to the E. the mountains of Elburz (famed in the Persian traditions as the abode of dæmons); to the N. the snow-clad summit of the lofty Dumavend; and to the W. a plain enriched with cultivation and villages, and forming a delightful contrast with the rugged and stupendous rocks which skirt it on the N. and S. Tehraun is about four miles in circumference, surrounded by a strong wall, flanked by innumerable towers, and a noble dry ditch, with a glacis between it and the wall. The only building of consequence within the city is the citadel, which contains the palace of the sovereign and his officers. It was founded by Kurim Khan, enlarged by the late king, and beautified by the present sovereign. The fortifications can be considered as formidable only in a country where the military art is unknown. The population is variable, being in summer about 10,000, and in winter not less than 60,000 people. The environs of Tehraun are not unpleasant; the plain, to the E. and W., being covered with villages, and abounding in grain. On the N. side the king has completed a palace, which, from its situation, and the fine gardens that surround it, is a most delightful residence. There are many reasons which have probably induced the late king to fix upon Tehraun as the capital of his dominions. Its central situation, and the easy defence

which it affords to the Persian empire; the fertility and productiveness of the surrounding country; the number of wandering tribes that have settled round it, and that may be easily and soon assembled; and above all, perhaps, its proximity to Astrabad, the native city of Aga Mahomed Khan, and also to Mazanderan and Dahestan, countries possessed by the Kajer tribe, of which he was the chief, and on whose power and affection to his person his authority was in a great measure founded;—all these considerations might have induced him to make this city the capital of the empire. N. lat.  $35^{\circ} 40'$ . E. long.  $50^{\circ} 52'$ .

TEHROOT, or ZEHEROOT, a town of Persia, in the province of Kerman, surrounded by numerous gardens; 8 miles N.W. by W. from Subzifan, and about 52 miles from the ruins of Bumm.

TEHUACAN, or TEGUACAN, a pleasant town of New Spain, between Oaxaca and Orizava. It is situated in a delightful vale, near a river of the same name, called also Rio Grande, of a nitrous quality, and so petrifying a nature, that the shores resemble ruinous walls. It has four churches; and the streets, squares, and houses are neat and modern. The chief market is that of wheat, which is excellent, and the pomegranates are highly esteemed. Besides numerous families of Spaniards and Mulattoes, here are about 2080 Indians. In the vicinity of this town are two wheat-harvests, one in May, the other in September.

TEHUELS, a large lake of South America, towards the S. of Chili.

TEHUKHA, a town of Thibet; 4 miles S. of Jhanfu Jeung.

TEICHOPŒUS, *τειχοποιοι*, among the Athenians, an officer who had the care of the city walls; their number was the same with that of the tribes, every tribe having the choice of one.

TEIGN, in *Geography*, a river of England, in the county of Devon, which runs into the English Channel at Teignmouth.

TEIGNMOUTH, a market-town in the hundred of Exminster, and county of Devon, England, is situated, as its name imports, at the mouth of the river Teign, and is sheltered on the east and north-east by a chain of hills, near the foot of which it stands. It is distant from Exeter 12 miles S. by E., and from London 187 W.S.W. A small rivulet divides the town into two parts or parishes, called West and East Teignmouth. The town is recorded to have been burnt in the tenth century by the Danes, who, having landed here, and defeated the king's lieutenant, ravaged the country to a considerable extent. It was also nearly consumed in the reign of queen Anne, when the French landed and set fire to it: one of the new streets, erected with the money procured by a brief for the distressed inhabitants, was named French-street, as a memorial of the calamity. Since that period the town has become of much greater importance, and is now one of the most fashionable watering-places in the western part of England. The principal resort of company is East Teignmouth, where the public rooms and theatre are situated: the former, a neat building, contains tea, coffee, assembly, and billiard-rooms; the theatre has been recently built on a spot of ground given by lord Courtenay, and was first opened in the summer of 1802. A walk or promenade leads from the public rooms towards the south, over an extensive flat called the Dan, on which is a small fort erected for the defence of the town. The view hence, up the river, is extremely beautiful; the ground gradually rising on each side into verdant hills, well cultivated, and adorned with woods. The cliffs overhanging the sea have a singular appearance, being, with the exception of

a few broad patches of verdure, of a deep red colour, and mount in rude irregular shapes to the height of seventy or eighty feet. Near the centre of West Teignmouth is the church, a very ancient stone fabric, built in the form of a cross: the roof is supported in a singular manner by the ramifications of a wooden pillar, that was formed from the trunk of a single tree. East Teignmouth church is a venerable pile near the beach, and, from the appearance of its architecture, was probably one of the earliest structures erected after the coming of the Normans. The trade of Teignmouth consists chiefly of commercial intercourse with Newfoundland; the exportation of clay, and the importation of coal; and is carried on principally in craft built at the place, where are conveniences for launching vessels of a hundred tons. The clay exported is brought from Bovey, for the most part by a canal; and dug on the estate of James Templar, esq., who, with true patriotism, is employed indefatigably in promoting the solid interests of his country, by improving agriculture, and encouraging manufactures. West Teignmouth had anciently a chartered market, held on Sundays; but this was discontinued by order of the sheriff in the reign of Henry III. The market is now held on Saturdays. Salmon, trout, whiting, mackarel, and various other kinds of fish, are taken here; and by some excellent local regulations, the inhabitants have the privilege of supplying themselves before any can be sold to the dealers. The lord of the manor holds a court-baron, or court-leet, in the town once every year: at which court a jury is nominated, two constables deputed and sworn, and a portreeve chosen, who is invested with considerable authority. In the population return of the year 1811, West Teignmouth was stated to contain 441 houses; East Teignmouth, 188; the inhabitants of the former being 2080; of the latter 813: making an aggregate of 2893 persons, occupying 629 houses.

Nearly opposite Teignmouth, and almost under the promontory called the Ness, is the hamlet of Shaldon, the property of lord Clifford, which has lately become a favourite summer residence for many families who visit the watering places on this coast. The chapel, erected about the year 1670, stands in a beautiful situation, a little above the Teign, about three quarters of a mile from the hamlet, and is approached by a level walk shaded with luxuriant trees.—*Beauties of England and Wales*, vol. iv. Devonshire. By J. Britton and E. W. Brayley, 1807. Warner's Walk through the Western Counties, 1800.

TEIJEUT, a town of Morocco; 15 miles S.E. of Mogador.

TEIL, a river of France, which runs into the Atlantic, N. lat. 47° 39'. W. long. 3° 8'.

TEIL, *Le*, a town of France, in the department of the Ardèche, on the Rhone; 12 miles S. of Privas.—Also, a town of France, in the department of the Ille and Vilaine; 15 miles S.E. of Rennes.

TEILLEUL, *Le*, a town of France, in the department of the Channel; 6 miles S. of Mortain.

TEIN, a town of Bohemia, in the circle of Pilsen; 6 miles N.E. of Tachan.

TEIN, or *Teyn*, a town of Bohemia, in the circle of Bechin; 4 miles S. of Bechin.

TEINITZ, a town of Bohemia, in the circle of Pilsen; 26 miles S.W. of Pilsen. N. lat. 49° 30'. E. long. 12° 57'.—Also, a town of Moravia, in the circle of Brunn; 27 miles S.S.E. of Brunn.

TEINITZ *Jungfern*, a town of Bohemia, in the circle of Schlan; 8 miles W. of Schlan.

TEINTS, and *Semi-Teints*, in *Painting*, denote the se-

veral colours used in a picture, considered as more or less high, or bright, or deep, or thin, or weakened, and diminished, &c. to give the proper relief, or softness, or distance, to the several objects. See COLOURING.

The word is pure French, where it signifies the same.

TEIRCE, or TEIRS. See TIERCE.

TEISBACH, in *Geography*, a town of Bavaria, on the Iser; 1 mile W. of Dingeligen.

TEISENDORF, a town of the archbishopric of Salzburg; 12 miles W.N.W. of Salzburg.

TEISKO, a town of Sweden, in Tavastland; 45 miles N.N.W. of Tavasthus.

TEISSIER, ANTHONY, in *Biography*, a voluminous French writer, was born at Montpellier in the year 1632. Having studied Greek and philosophy at Orange, and being destined for the ministry among the Calvinists, he applied to Hebrew and theology at Nismes; and after spending some time in the academy at Montauban, he removed to that of Saumur. From thence he went to Paris, where he cultivated an acquaintance with several learned men; but giving up his designs for the ministry, on account of a disorder under which he laboured, he turned his thoughts to jurisprudence, and took the degree of LL.D. at Bruges. In 1683 he married; but upon the revocation of the edict of Nantes, he was obliged to quit France. He then retired with his wife to Switzerland, and was recommended by Turretin and Heidegger to the family of Escher, a burgo-master of Zurich. Declining to accept advantageous offers if he returned to France, he engaged with the senators of Berne for two years in conducting a French gazette in that city. In 1691 he quitted Berne and went to Zurich; and from thence he proceeded to Brandenburg, where refugees enjoyed common privileges with those of the natives of the country. At Berlin, the elector appointed him historiographer, with an annual pension of 300 crowns, which was successively augmented. He was also honoured with the title of counsellor of legation, and ordered by the elector to translate into French the life of his father, Frederic William, written in Latin by Puffendorf. For this service he was liberally rewarded, though his translation was never printed. He was afterwards employed in composing many works for the instruction of the prince royal; and though his constitution was delicate, he enjoyed good health till his death, which happened in 1715, in the eighty-fourth year of his age. It would exceed our limits to enumerate all his works; an ample account of them may be found in the General Biography.

TEI-TCHANG, in *Geography*, a town of Corea; 13 miles N.N.E. of Haimen.

TEITEI, in *Ornithology*, the name of a Brazilian bird, a species of tanagra, in the Linnæan system, called also *guiranhemegeta*, and *guraundi*.

It is of the size of our red-breast, and beautifully coloured.

It sings very sweetly, and is kept in cages, five or six together in the same cage. *Marcgrave's Hist. of Brasil*.

TEITH, in *Geography*, a river of Scotland, formed by streams from several lakes, in the county of Perth, which runs into the Forth, two miles above Stirling.

TEJUCO, the capital of the Diamond district in Brasil, situated in a ravine at the foot of a mountain. Tejuco is separated by the small rivulet of St. Francisco from the opposite mountains. The greatest of the diamond works, called Mandanga, is situated on the river Izgitanhanha, and employs about 1000 negroes, sometimes double this number. This rich river, formed by the junction of several streams, is as wide as the Thames at Windsor, and in general from three

to nine feet deep. The part now working is a curve or elbow, from which the current is diverted into a canal cut across the tongue of land round which it winds; the river being stopped below the head of the canal by an embankment formed of several thousand bags of sand. The deeper parts of the channel of the river are laid dry by large caissons, or chain-pumps, worked by a water-wheel. The mud is then carried off, and the *caçalhão* is dug up and removed to a convenient place for washing by machinery adapted to this purpose. The contrivance for obtaining the diamonds from the *caçalhão* is particularly described by Mr. Mawe, *ubi infra*. Tejuco is situated in a sterile district, which produces nothing for the maintenance of its inhabitants, whose number is about 6000; and therefore depends for a supply of provisions, on farms situated at the distance of several leagues. Nevertheless, Tejuco may be called flourishing, on account of the circulation of property created by the diamond-works in its vicinity. The annual sum paid by government for the hire of negroes, salaries of officers, and various necessaries, such as nitre and iron, does not amount to less than 35,000*l.* and this, added to the demands of the inhabitants of the town and its neighbourhood, occasions a considerable trade. The shops are stocked with English cottons, baizes, and cloths, and other manufactured goods; also hams, cheese, butter, porter, and other articles of consumption, which are brought on mules from Bahia and Rio de Janeiro. Tejuco, from its situation on the side of a hill, is very irregularly built; its streets are uneven, but the houses in general are well constructed, and in good condition, compared with those of other towns in the interior. Its name, signifying in the Portuguese language a muddy place, is derived from places of that description near it, which are rendered passable by being covered with large pieces of wood. The diamonds are locked in the treasury under three locks; and those found in the district are deposited every month, as they are received from the works; they are carefully weighed, and some of them selected and kept separate. The average quantity obtained may be estimated at from 20,000 to 25,000 carats annually, which are sent under a military escort to Rio, and there lodged in the treasury. The diamonds are tied up in black silk bags, and deposited in elegant inner cabinets, all which are locked up in strong chests, bound with iron. Tejuco affords some good barley, but grafs for cattle is scarce and dear. Most parts of the country abound in oranges, pines, peaches, guavas, and a great variety of indigenous fruits: ginger and pepper grow spontaneously, and many species might probably be cultivated with success. Mawe's Travels in the Interior of Brazil, 1812.

TEJUGUACU, in *Zoology*, the name of a species of lizard, common in the Brazils, and called also *temapara*.

It much resembles the iguana in its general figure, but differs from it in that its whole body is black, only variegated with some white spots. It lives principally on the sucking of eggs, but it is capable of bearing hunger a long time; Marcgrave having kept one alive seven months without eating. This species afforded also a certain testimony to that author of the reproduction of the tail when cut off. Ray.

TEIUM, in *Ancient Geography*, a town of Asia Minor, situated on the Euxine sea, on the frontiers of Paphlagonia, near the small river Billis, 370 stadia from the town of Heraclea. It was a Greek Ionian colony, which derived its name and its origin from *Tios*, a Milesian priest, according to Arrian and Mela. The worship of Jupiter named Patarus was practised in this town, according to Demosthenes. On the E. the territory of this town was bounded by the river Parthenius. The town was much augmented when the empire of the Persians was destroyed.

TEIUNHANA, in *Zoology*, the name of a small American lizard. It is about the thickness of one's little finger, and has a sharp nose. Its tail is very slender, six fingers breadth long, and terminates in a point almost as sharp as a needle. Its head is covered with scales; and its back, sides, and legs, with a tender skin, as soft as fat to the touch; and its tail is covered with extremely minute scales, of a square figure. Ray.

TEKAT, in *Geography*, a town of Asiatic Turkey, in Natolia; 10 miles N. of Kiangari.

TEKEBI, a town of Egypt; 22 miles W.S.W. of Damietta,

TEKEH, a town of Turkish Armenia; 40 miles S.E. of Trebisond.

TEKEREE, a town of Hindoostan, in Candeish; 14 miles E. of Barrawnay.

TEKIN, a town of Asiatic Turkey, in Carmania; 100 miles W. of Tocat.

TE-KING, a city of China, of the second rank, in Quang-tong, near the river Si; 1064 miles S.S.W. of Peking. N. lat. 23° 12'. E. long. 111°.—Also, a city of China, of the second rank, in Quang-tong; 1065 miles S. of Peking. N. lat. 23° 12'. E. long. 110° 50'.

TEKKIUR DAG, a mountain of European Turkey, in Romania; 32 miles S.S.E. of Adrianople.

TEKLA, a town of Bohemia, in the circle of Chrudim; 6 miles S.W. of Leutmischl.

TEKMABAD, a town of Persia, in the province of Segestan; 70 miles E.N.E. of Bost.

TEKOA, a village, and anciently a city of Palestine, built by Rehoboam, king of Judah, and considerable ruins appear of its ancient grandeur. It was the native place of the prophet Amos; 9 miles S. of Bethlehem.

TEKOLY, a town of Hindoostan, in Bahar; 53 miles S.S.W. of Patna.

TEKUPHÆ, or ΤΗΚΥΡΗÆ, in the *Jewish Chronology*, are the times in which the sun proceeds from one cardinal point to the next.

The same term is also applied to the moment in which the sun enters a cardinal point: these four terms, or tekuphæ, into which the Jews divided their solar year, are observed among the Jews with a great deal of ceremony; the reason, as we are informed by Munster, is this:

That people have a notion, that in each tekupha the sun has a separate angel appointed to guard and direct it; and that in the very point where the sun finishes one tekupha, and enters upon another, before the one director has taken place of the other, the devils have a power to exercise all kinds of tyranny in the water.

And hence, they fancy, that if any body drinks the smallest quantity of water at that time, he will infallibly have a dropsy, or some other grievous distemper.

The tekupha of Tifri corresponded to the autumnal equinox, that of Tebeth to the winter solstice, that of Nisan to the vernal equinox, and that of Tamuz to the summer solstice.

TEKY SOUND, in *Geography*, a road on the coast of Georgia, south of the Savannah river, where a large fleet may anchor in ten or fourteen fathoms, and have safe entrance over the bar of the river; the flood tide generally seven feet.

TEL ARENAS, a town of Asiatic Turkey, on the Euphrates; 5 miles W.N.W. of Diarbekir.

TEL Gizir, a town of Asiatic Turkey, in the province of Diarbekir; 16 miles W. of Merdin.

TEL Kiaran, a town of Asiatic Turkey; 30 miles S.S.W. of Diarbekir.

**TEL Mufet**, a town of Asiatic Turkey, in the government of Diarbekir; 33 miles N.W. of Mosul.

**TEL el Judieh**, a town of Egypt, where the Jews had formerly a temple, destroyed by Vespasian; 17 miles N.E. of Cairo.

**TELA**, in *Ancient Geography*, a town of Spain, on the route from Asturica to Saragossa, between Intercatia and Pintia. Anton. Itin.

**TELA**, or *Constantia*, a place of Asia, in Mesopotamia, near the mountains, about N. lat.  $37^{\circ} 25'$ .

**TELA Cellulosa**, in *Anatomy*, the *CELLULAR Substance*; which see. It is sometimes also called *tela mucosa*.

**TELACH**, in *Geography*, an island of Russia, in the Penzinskoi sea. N. lat.  $61^{\circ} 35'$ . E. long.  $159^{\circ} 14'$ .

**TELAMON**, in *Ancient Geography*, a promontory of Italy, in Etruria, at the foot of which was a port, between the rivers Almira and Alma. (Anton. Itin.) Pliny calls this port Telamon.

**TELAMONE**, in *Geography*, a town of the Stato del Presidii, on the coast; 10 miles N. of Orbitello. N. lat.  $42^{\circ} 38'$ . E. long.  $11^{\circ} 6'$ .

**TELAMONES**, a name given by the Romans to what the Greeks called *Atlantes*; viz. the figures of men supporting entablatures, and other projections. See *ATLAS*.

The word, according to some, is derived from the Greek *τελαμων*, from *τελαω*, or *τελαω*, *I bear*.

Among the Greeks they were called *atlantes*, *ατλαντες*, which comes from the same word, *ταλαω*, or *τελαω*, by the figure metathesis.

**TELAMONES** is also used by surgical writers sometimes for lint, and sometimes for the fillets or bandages which they apply over their dressings.

**TELANA**, in *Ancient Geography*, a very ancient town of Asia, in Assyria. Steph. Byz. says that the king made it the place of his residence before Nineveh was built.

**TELANADING ISLANDS**, in *Geography*, three small islands lying east and west, near the N.W. coast of the island of Gilolo. N. lat.  $2^{\circ} 18'$ . E. long.  $127^{\circ} 30'$ .

**TELANDRIA**, in *Ancient Geography*, an island on the coast of Lycia, in Asia Minor. Pliny.

**TELANDRUS**, a town of Asia Minor, in Lycia. Pliny.

**TELAPSAR**, in *Geography*, a town of Asiatic Turkey, in the province of Diarbekir; 20 miles W. of Mosul.

**TELARUSE**, a river of Asia, which forms the north boundary of the kingdom of Queda, separating it from Lower Siam, and runs into the East Indian sea, N. lat.  $6^{\circ} 55'$ . E. long.  $99^{\circ} 42'$ .

**TELAUGIA**, in *Natural History*, the name of a genus of scrupi, of a glittering appearance, usually containing flakes of talc, and emulating the structure of the granites. Hill.

Of this genus we have twelve species.

**TELCHINES**, in *Ancient Geography*, a people who derived their origin from the isle of Crete. They established themselves in Cyprus, and in Rhodes, where it is said they invented the use of iron and brass.

**TELCOOTE**, in *Geography*, a town of Hindoostan, in Orissa; 20 miles S.E. of Jaypour.

**TELDOM HOTUN**, a town of Chinese Tartary, on the west side of the river Saghalien; 745 miles N.E. of Peking. N. lat.  $49^{\circ} 56'$ . E. long.  $127^{\circ} 33'$ .

**TELE**, *τελε*, among the Athenians, these revenues that were brought in by lands, mines, woods, and other public possessions, set apart for the use of the commonwealth; as

also tributes paid by sojourners and freed-servants, and the customs laid upon certain trades and goods.

**TELEBA**, in *Ancient Geography*, a town of Albania, between the mouth of Soana and that of Garrus. Ptol.

**TELEBOAS**, a river of Asia, in the environs of the sources of the Tigris; surrounded, as Xenophon says, by a great number of villages.

**TELEGRAPH**, a machine adapted for communicating intelligence at a considerable distance, by making various signals, which have been previously agreed upon between two parties, to represent letters, words, or ideas. The means of making signals that are used in naval and military operations, are not called telegraphs, although they effect in a great degree the same object. See *SIGNAL*.

The word telegraph, which is derived from two Greek words, *τελε*, at a distance, and *γραωω*, to write, was brought into use about 1793 or 1794, when the French directory established machines of this kind for communicating intelligence between Paris and all the principal towns in France. The British government soon after adopted the same measure, and it has since become very general.

No machine for making signals can with propriety be called a telegraph, unless it is adapted to express a sufficient number of letters or words to form a complete language, and which can therefore be made to communicate any information which can be expressed by oral or written language. Less perfect systems of signals, which extend only so far as to communicate intelligence of events which have been foreseen, and the appropriate signals previously arranged, are still called signal flags, signal lanthorns, signal guns, or fires, &c.

When people wish to transmit intelligence to others at a distance, in a quicker manner than by letters sent by messengers or carrier-pigeons, it can be done only by signals. These may be employed in three different ways: either by single signals, which, according to previous agreement, convey whole ideas; or by several successive signals, which, by representing letters and words, answer the same purpose; or otherwise, by employing signals which express numbers, each person being provided with a dictionary in which every word has a number affixed to it.

The first kind of signals were employed in the earliest periods, and some of them were suited to the ear as well as to the eye. For the making of visible signals, the ancients employed fire and smoke, torches, flags, &c.; and in modern times, sky-rockets have been used. For the audible signals, they employed drums and trumpets; and since the invention of gunpowder, the firing of cannon has been applied to the like use. But all these methods are incapable of expressing what could be communicated by speech and writing; and the means of expressing all the possible variations and combinations of the letters of the alphabet, form, in a proper sense, the true telegraphic art. Even the signals commonly used at sea, as they extend only to particular circumstances, are, when compared to signals by letters, only a kind of hieroglyphics.

The proposed object of the telegraphic art is, therefore, to obtain a figurative language, the characters of which may be distinguished at a distance. On the first reflection, we find that the practicable modes of such distant communications must be confined to sound and vision; each of which is in a great degree subject to the state of the atmosphere: for independent of the wind's direction, it is known that the air is sometimes so far deprived of its elasticity, or some other quality that influences the conveyance of sounds, that the heaviest ordnance can scarcely be heard farther than the shot flies. It is also well known, that in thick hazy weather, the largest and most

most defined objects become totally obscured at a short distance. No instrument, therefore, designed for the purpose can be perfect. We can only endeavour to diminish these irremediable defects as much as may be.

The most barbarous nations employed signals, which could quickly inform them of the approach of enemies, as appears by the testimony of several ancient authors; and there is reason to believe that some sort of telegraphic communication was in use among the Greeks. The destruction of Troy was certainly known in Greece very soon after it took place, and before any person could have returned from it. A Greek play begins with a scene, in which a watchman defends from the top of a tower in Greece, and gives information that Troy is taken. "I have been looking out these ten years (says he) to see when that would happen, and this night it has been done."

In addition to the Stenterophonic tube which was known and used by Alexander the Great, the Romans had a method, in their walled cities, either of forming a hollow in the masonry, or of applying tubes to the walls, so as to confine or augment sound, and convey information to any part of their works. In lofty houses and warehouses, it is now a common custom to have a pipe, by way of speaking trumpet, to give orders from the upper apartments to the lower. By this mode of confining its volume, sound may be carried to a very considerable distance; but beyond a certain extent the sound will lose all articulation, and only convey alarm, without giving directions.

Every city of the ancients had its watch-towers; and the castra stativa of the Romans had always some spot, elevated either by nature or art, from whence signals were given to the troops cantoned or foraging in the neighbourhood: but it appears that they had not arrived to any greater refinements in the telegraphic art, than that on seeing a certain signal they were immediately to repair to their appointed stations. Flags or ensigns, with their various devices, are of the earliest invention, especially at sea, where, from the first idea, which was most probably that of a vane, to shew the direction of the wind, they have been long adopted as the distinguishing marks of nations, and are now so perfected into a system of signals, that every requisite order and question is received and answered by the most distant ships of a fleet.

The mode of signalling in use about half a century ago was very imperfect. It was a good deal amended and simplified by that lamented officer admiral Kempenfelt; and his system, as it was called, continued in use till within these twenty-five years. It was superseded in the navy by sir Home Popham's, who first brought into practical utility a plan originally, it is believed, suggested by Mr. Richard Gower, of the East India Company's service, in his "Practical Seamanship," published in 1794. This was the substitution of ten or twelve numbered flags, for a great number of flags. It is surprising that this easy scheme should not sooner have been discovered and adopted. Instead of the immense "colour chest" that we and our naval cotemporaries can recollect, and the difficulty of finding and hoisting the variety of flags required, it is pleasing to witness the facility with which communications can be now made, by means almost as easy of application as the pen.

The system now in use, originating, as we have stated, with an officer of the East India Company's service, has recently been greatly improved by another of these officers. It is not easy to describe the nature of those improvements; nor proper, perhaps, were it otherwise; for the directors of the East India Company have deemed it expedient to keep them secret. The author of them is captain Thomas Lynn. His work was printed in 1814, at the Company's expence, in a

considerable quarto volume, under the title of "Lynn's Improved System of Telegraphic Communication." It is adopted throughout the extensive service of the East India Company; and we are glad to see it noticed in the preface to the volume, that the highly respectable court of directors most liberally patronized the work and its author. We do not find, notwithstanding the manifest advantage of the "Improved System," that it has yet been introduced into the royal navy; although every officer in that as well as the East India Company's service, who have had opportunities of trying it, are loud in its praise. It adapts itself to every description of telegraphic machinery now in use; or, as far as we can see, that can be used: it requires fewer flags than were heretofore necessary; and its powers are vastly greater than the other codes or systems. This paragraph, and perhaps this whole page of our dictionary, can be thus communicated, word for word, or phrase by phrase, without difficulty, and with a rapidity unattainable by any scheme hitherto published. The numbers, and powers, and meaning of the signals, may be changed at pleasure: so that if the work fall into improper hands, it merely communicates the principle on which the system is founded.

In applying this or a similar mode of communicating intelligence in land service, several objections present themselves: the variety of communications necessary to be made is so much greater, that the combination would become too complicated; and if the person for whom the information is intended, should be in the direction of the wind, the flag would then present a straight line only, and at a little distance would be scarcely visible. The Romans were so well aware of this inconvenience of flags, that many of their standards were solid, and the name manipulus denotes the rudest of their ensigns, which was a truss of hay fixed on a pole.

A beacon or bonfire, made of the first inflammable materials that offered, being the most obvious, is perhaps the most ancient mode of general alarm. By being previously concerted, the number of points where the fires appeared may have particular intelligence affixed. The same observations may be referred to the more modern plan of throwing up rockets, whose number, or the places from whence they are thrown, may have affixed significations. Many of our hills still retain the name of beacon hills, from the signals which used to be made upon them, by means of fire and smoke, which were the chief things employed during the dark ages, and in the times of the feudal system. The fire was used by night, and the smoke by day. Within a few years, signals made by these means were very common amongst the smugglers on our coast.

The machine of Æneas, who wrote a treatise on the duties of a general in the time of Aristotle, is described by Polybius to have consisted of two earthen vessels, made exactly similar in all their dimensions: they were to be filled with water, and each was to have a cock or spout, which could be opened or shut at pleasure, and would, when open, discharge an equal quantity of water from both vessels, so that each of the vessels would take precisely the same period of time to discharge the whole, or any given proportion, of its contents. A float of cork was to be provided for each vessel to rest upon the surface of the water, and support a perpendicular stem or index, which could be divided, and have certain sentences written to correspond with each division. The apertures of the spouts of the two vessels were to be previously adjusted, and the vessels filled with water to the same height, so that their floats and indices would correspond in pointing out the same sentences: then, if both cocks were opened at the same instant, the water would run out from each vessel, and the floats of both would subside together, so that when either index  
flood

hood at a particular sentence, the other index would, at the same time, point out the same sentence. Now this operation could be equally well performed when the two vessels were moved to any distance asunder, provided the observers were within sight of each other, to be able to make the requisite signals for opening and shutting the cocks of both vessels at the same moment. The author thus describes the use of this instrument: The two vessels being prepared and adjusted, they must be carried to the two places where the signals are to be made and observed; water is poured into each, and the floats and indices are put into the vessels. When any of the events which are written upon the indices shall happen, a torch or light is raised, which must be held aloft till such time as another is raised by the party to whom it is directed. (This first signal is only to give notice that both parties are ready and attentive.) Then the torch or other light must be taken away, and the cocks set open instantly by both parties. When the interval or division on that part of the index where the event, of which notice is to be given or written, shall be fallen to a level with the vessels, then the man who gives the signals lifts up his torch, and on the other side, the correspondent signal maker immediately shuts the cock of his vessel, and looks at what is written on that part of the stick which touches the mouth of the vessel; on which occasion, if every thing has been executed exactly and equally on both sides, both parties will read the same thing.

The proper telegraphic art was not wholly unknown to the ancients. The Greeks and the Romans made use of pots filled with lighted twigs and straw for signals, over which they poured oil; and these being placed in certain rows, expressed certain letters, according to the order in which each row was lighted.

Polybius describes a new method of communication, which was invented by Cleoxenus, or by Democlitus, and which Polybius himself very much improved. It possesses the principal advantage of the modern telegraph, *viz.* that, by means of signals, it communicates the letters of the alphabet, and can therefore be used to express any thing which can be required. It is only inferior to the telegraph in the means of making the signals, which is by the light of torches, and rather complicated, so that it would be tedious to transmit any thing more than short sentences. Polybius describes this method, which he calls *Pyrria*, in the following manner: Take the letters of the Greek alphabet, and divide them into five parts, each of which will consist of five letters, except the last division, in which there will be only four. Let these be fixed on a board, in five columns. The man who is to give the signals is then to begin by holding up two torches, which he is to keep aloft till the other party has also shewn two: this is only to denote that both sides are ready: these torches are then withdrawn. Both parties are provided with boards, on which the letters are disposed as formerly described. Then the person who gives the signal is to hold up torches on the left hand, to point out to the other party, from what column he shall take the letters as they are pointed out to him: thus, if the letter is to be from the first column, he holds up one torch; if from the second, two; and so on for the others. He is then to hold torches on the right hand, to denote the particular letter of the column that is to be taken. All this must have been agreed on beforehand. The man who gives the signals must have an instrument (*διωπτερον, perspective*), consisting of two tubes, and so placed, that by looking through one of them he can see only the right side, and looking through the other, he can only see the left-hand side of him who is to answer. The board must be set up near this instrument; and the stations on the right and left must each be surrounded with a wall ten feet broad,

and about the height of a man, that the torches raised above it may give a clear and strong light, and that when taken down they may be completely concealed.

The *Steganographia trithemiana* of a Benedictine monk, in the fifteenth century, seems to have been something of the same kind; but the first recorded experiment, after the manner of the Greeks, is described by Kircher, in his "*Ars magna Lucis et Umbrae*," under the title of *Cryptogamia casoptrica*; it was however imperfect, and could be employed only at a certain distance. Schott, in his "*Technica curiosa*," proposes, after an anonymous author, to erect posts upon an eminence, so as to be distinguished through a telescope, and on which proper signals could be elevated, as might be necessary.

The marquis of Worcester, who is so justly celebrated for having first discovered that the force of steam could be applied to mechanical purposes, brought telegraphic communication to a considerable degree of perfection, if at least we give him credit for having really effected every thing which he mentions in his *Century of Inventions*. This little tract was published in 1663, and contains the following articles.

"No. 6. How at a window, as far as eye can discover black from white, a man may hold discourse with his correspondent, without noise made, or notice taken, being according to occasion given and means afforded, *ex re nata*, and no need of provision before-hand, though much better if foreseen, and means prepared for it, and a premeditated course taken by mutual consent of parties.

"No. 7. A way to do it by night, as well as by day, though as dark as pitch is black."

The marquis gives us no idea of the means which he used for exhibiting his signals, by which we can judge of the practicability of his plan for communicating any detailed intelligence.

Kefslor, in his *Concealed Arts*, advises characters to be cut out in the bottom of a cask, so as to appear luminous when a light is placed within, and the characters must be changed successively to express words and sentences.

*Dr. Hooke's Telegraph.*—The first idea of a telegraph upon a similar construction to those used at present, was suggested by Dr. Hooke towards the end of the last century, the siege of Vienna by the Turks having turned his attention to the business. He gave the first complete description of such a machine, as appears by the following extract, from a paper of his, read before the Royal Society on the 21st of May, 1684. "I proposed (says he) some years since, a method of discoursing at a distance, not by sound but by sight: I say that it is possible to convey intelligence from any one high and eminent place, to any other that is in sight of it, though thirty or forty miles distant, in as short a time almost as a man can write what he would have sent; and as suddenly to receive an answer, as he that receives it has a mind to return it, or can write it down on paper. Nay, by the help of three, four, or more eminent places visible to each other, lying in a straight line, 'tis possible to convey intelligence almost in a moment, to twice, or thrice, or more times that distance, with as great a certainty as by writing.

"For the performance of this, we must be beholden to a late invention, which we do not find any of the ancients knew; that is, the eye must be assisted with telescopes, that whatever characters are exposed at one station, may be made plain and distinguishable at the other.

"First: For the stations, if they be far distant, it will be necessary that they should be high, and lie exposed to the sky; that there be no higher hill or part of the earth beyond them, that may hinder the distinctness of the characters,

## TELEGRAPH.

ters, which are to appear dark against the sky, beyond them appearing white, by which means also the vapours near the ground will be passed over and avoided. Next, in choosing these stations, care must be taken, as near as may be, that there be no hill that interposes between them, that is almost high enough to touch the visible ray, because in such cases the refraction of the air of that hill will be very apt to disturb the clear appearance of the object. The stations being found convenient, the next thing to be considered is, what telescopes will be necessary for each station. One of these telescopes must be fixed at each extreme station, and two of them in each intermediate station; so that a man for each glass, sitting and looking through them, may plainly discover what is done in the next adjoining station, and with his pen write down on a paper the characters there exposed, in their due order; so that there ought to be two persons at each extreme station, and three at each intermediate one, that intelligence may be conveyed backwards and forwards at the same time. Next there must be certain times agreed on, when the correspondents are to expect it; or else there must be set at the top of a pole, in the morning, the hour appointed by either of the correspondents for acting that day.

“Next there must be convenient apparatus of characters, consisting of at least as many distinct characters as there are necessary letters in the alphabet, (to be made use of as is expressed in *Plate Telegraph, fig. 1.*) And these must be either day characters or night characters. If they are to be made use of in the day-time, they may all be made of deals, and of a size convenient for the several distances, any one of which characters may signify any one letter of the alphabet, and the whole alphabet may be varied 10,000 ways, so that none but the two extreme correspondents shall be able to discover the information conveyed. If the characters are for the night, then they may be made with links, or lights disposed in a certain order, which may be covered or uncovered, according to the method agreed on. There will be also requisite several other characters, which may for expedition express a whole sentence, such as ‘I am ready to communicate;’ ‘I am ready to observe.’ I could instance a hundred ways of facilitating the method of performing the design with the more dexterity and quickness, and with little change, but that I think will be needless at present, since, whenever such a way of correspondence shall be put in practice, those and many more than I can think of at present will of themselves occur, so that I do not in the least doubt but that with a little practice all things may be made so convenient, that the same character may be seen at Paris, within a minute after it hath been exposed in London; and that the characters may be exposed so quick after one another, that a composer shall not much exceed the exposor in swiftness, and this not only at the distance of one station, but of an hundred; for supposing all things ready at all of those several stations for observing and exposing as fast as the second observer doth read the characters of the first exposor, the second exposor will display them to the observer of the third station, whose exposor will likewise display them for the fourth observer, as fast as his observer doth name them to him or write them down. There may be many objections brought against this way of communication, because it has not yet been put in practice, but hardly any that may not be easily answered and obviated.”

Dr. Hooke illustrates his invention thus: Let A B C (*fig. 2.*) represent three very long masts or poles erected, E the top piece that joins them together, D a screen, behind which all the deal-board characters hang upon certain rods or lines, and may, by the help of small lines connected with

each of them, be exposed at F, or drawn back at D, as occasion may require.

This proposal of our ingenious countryman is very complete and well studied; it would be less convenient and expeditious than the modern telegraphs, but would certainly have answered very useful purposes, with the advantage of being very free from the uncertainties and errors of more complete machines, which, at the same time that they admit of making a greater variety of signs than the letters of the alphabet, are for the same reason more liable to mistakes in exhibiting as well as in reading or translating them. The only obvious improvement on Dr. Hooke's telegraph is, that, instead of concealing the characters behind the screen D, they should be kept down below in the house on which the machine is to be erected, and be hoisted up into the frame when they are to be exhibited.

M. Amontons, an ingenious French academician who studied mechanics, was born at Paris in 1663, and died in 1705, at the age of forty-two. He proposed the following method: Let there be people placed in several stations, and at such a distance from each other, that by the help of a telescope, a man at one station may see a signal made in the next before him: he must immediately repeat the same signal, that it may be seen by persons in the station next after him, who are to communicate it to those in the following station, and so on. These signals may be as letters of the alphabet, or as a cipher, understood only by the two persons who are in the distant places, and not by those who make the signals. The person in the second station making the signal to the person in the third the very moment he sees it in the first, the news may be carried to the greatest distance in as little time as is necessary to make the signals in the first station. The distance of the several stations, which must be as few as possible, is measured by the reach of a telescope. M. Amontons is said to have tried this method on a small tract of land, before several persons of the highest rank at the court of France; but we are not acquainted with the kind of apparatus he employed; all that we know of his method is precisely the same as Dr. Hooke's.

Guyot, a long time after Dr. Hooke, proposed tables, with letters cut out in them: and Paulian, in his *Dictionnaire de Physique*, describes a transparent figure, consisting of one perpendicular and three horizontal stripes, forming ten compartments, each of which can be rendered visible or invisible at pleasure, by blinds or shutters moveable from behind.

Mr. Richard Lovell Edgeworth, in a memoir which he presented to the Royal Society of Ireland (see their *Transactions*, vol. vi. p. 125.), adduces proof, that in 1767 he tried an experiment of the practicability of communicating intelligence by a swift and unsuspected mode; and for this purpose he employed a common windmill, and arranged a system of signals, which could be made by the different positions of the arms of its sails, the canvas being removed from one or more arms, as was required. These signals were made to denote numbers, and both parties were provided with vocabularies, in which all the words were numbered.

*French Telegraph.*—Although the telegraph was thus fully explained in 1684, it does not appear that this valuable invention was at all practised or applied to any useful purpose until 1793 or 1794, when the events of the French revolution had directed all the energies of that ingenious people to the improvement of the art of war. A report made by Barrere to the sitting of the French Convention in August 1794, attributes the invention of the telegraph which they used to citizen Chappe.

“The new invented telegraphic language of signals is an artful

artful contrivance, to transmit thoughts in a peculiar language from one distance to another, by means of machines, which are placed at different distances of from twelve to fifteen miles asunder, so that the expression reaches a very distant place in the space of a few minutes. This is now brought to such a state of perfection, that a correspondence may be conducted with Lisle, upon every subject and every thing: even proper names can be expressed; an answer may be received; and the correspondence thus be renewed several times a day. The only thing which can interrupt their effect is the weather, when the air is so very bad and turbid that the objects and signals cannot be distinguished. By this invention, remoteness and distance almost disappear, and all the communications of correspondence are effected with the rapidity of the twinkling of an eye. By its aid the operations of government can be very much facilitated, and the unity of the republic consolidated much more by the speedy communications with all its parts.

“The greatest advantage can be derived from this mode of correspondence, because, if thought proper, its objects need only be made known to certain individuals, or to one individual alone, or to the extremities of any distance: so that the Committee of Public Welfare may at present carry on a correspondence with the representative of the people at Lisle, without any other persons being acquainted with their objects. If Lisle was even besieged, we should know every thing at Paris that might happen in that place, and could send thither the decrees of the Convention without the enemy being apprised of it, or able to prevent it.”

M. Chappe's or the French telegraph is represented in *fig. 4*, which is made from some sketches taken from the telegraph on the palace of the Louvre, at the time of its first establishment, and published in the Monthly Magazine, and other publications.

A B is a beam or strong mast of wood, erected perpendicularly from the centre of a cabin or small house situated on a rising ground: it must be about 15 or 16 feet high above the top of the house. C D is a balance-beam, jointed to the top of the mast, so as to be moveable on its centre, like a scale-beam. This balance-beam, which is called the long indicator, may be placed vertically or horizontally, or any how inclined, by means of strong cords, which are attached to the central wheel or pulley D, which has two grooves in the edge to receive the cords. The long indicator is about 11 or 12 feet long, and 9 inches in breadth; and at each extremity it carries secondary indicators F, G, which likewise turn upon centres or joints, by means of four cords, which are conducted through a hollow in the centre pin or axis of motion of the long indicator, otherwise the motion of the long indicator to put it into different positions, would derange the cords, and alter the direction of the secondary indicators, which are capable of being placed in any position with respect to the long indicator, by those cords being conducted by pulleys down into the cabin, and there attached to other mechanism, by means of which the whole machine is moved, and can be made to assume any of the positions represented by the small figures in the plate, in which positions it forms a variety of different characters, to denote the letters of the alphabet or numerals.

That the indicators may be very light, and at the same time oppose the least resistance to the wind, they are formed by frames, the interior parts of which are filled up by small oblique and separate boards, which however, being seen in front, appear contiguous. The ends of the small indicators are carried beyond the centres, and carry counter-weights to balance the weight of the indicators; but these ends and balances are made so as to be invisible at a distance.

It is easy to find the number of signals possible to be made with this telegraph: for if we consider the great indicator as being fixed, we shall find that each of the smaller ones may distinctly take five different positions: two where it makes a right angle with the great indicator; two where it makes an angle of  $45^\circ$ ; and one where it falls back upon the great one, in which case it will disappear. Three other distinct positions might also be created; one where the small indicator would be horizontal with the great one, and two where it would make an angle of  $135^\circ$  with it.

The lesser indicators then, considered as single movers, will furnish five times five, or twenty-five signals. As the great indicator is also a mover, there are twenty-five times as many signals as this indicator has distinct positions; and as it has but four distinct positions, one horizontal, one vertical, and two inclined, there are in all four times twenty-five, or one hundred signals.

The manner of using the telegraph was as follows: At the first station, which was on the roof of the principal pavilion of the Louvre at Paris, M. Chappe, the inventor, received in writing, from the Committee of Public Welfare, the words to be sent to Lisle, near which the French army was at that time stationed. Each of the telegraphs in the line employed three persons to work it: one to move the machine, which was done by a single motion of a winch, and could therefore be effected in a moment. A second person was employed with a telescope to observe the telegraphs of the two adjacent stations, to receive the communications, and to know by their signals, if they had understood the communication made to them, and also to receive the answers. The third person was employed to write down the observations made by the second person, and to give orders to the first. The stations were about three or four leagues distant, and an observatory was situated near the Committee of Public Safety at Belleville, to observe the last telegraph.

The grammarian will easily conceive that sixteen signs may amply supply all the letters of the alphabet; since some letters may be omitted, not only without detriment, but with advantage. These signs, as they were arbitrary, could be changed every week: so that the sign for B one day, might be the sign for M the next; and it was only necessary that the persons at the extremities should know the key. The intermediate operators were only instructed generally in imitating and repeating these sixteen signals, which were so distinct, and so marked, as different the one from the other, that they were easily remembered. The construction of the machinery within the house was such, that each signal was uniformly given in precisely the same manner at all times. It did not depend on the operators' manual skill, because the position of the arms could never for any one signal be a degree higher or a degree lower than was intended, their movements being regulated mechanically. M. Chappe, having received at the Louvre the sentence to be conveyed, gave a known signal to the second station, which was Montmartre, to prepare: at each station the observers with telescopes were on watch, and each telegraph immediately gave the signal of preparation which he had received; and this being communicated successively through all the line, all the machines were brought into a state of readiness. The persons at Montmartre then received, letter by letter, the sentence from the Louvre, which they repeated with their own machine, and this was again repeated from the next height, with inconceivable rapidity, to the final station at Lisle, where the observations were written down, and translated according to the key which had been before arranged to be used, either by previous concert, or by some particular signal made with the telegraph, to denote that key which was used. The time taken

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taken up for each movement was about twenty seconds; of which the motion alone took up four seconds; and during the other sixteen, the telegraph was kept stationary, that it might be distinctly observed and written down by the people at the next station. The signs were sometimes made for words, and sometimes for letters: when in words, a small flag was hoisted; and as the alphabet could be changed at pleasure, it was only the corresponding persons at each end of the line who knew the meaning of the signs. In general, news was given every day about eleven or twelve o'clock; but the observers were constantly on the watch, and as soon as a certain signal was given and answered, they begun from one end to the other to move their machines. All the moveable parts were painted of a dark-brown colour, to be more distinctly visible when viewed against the bright sky.

Another line of telegraphs, from Paris to Landau, was completed in 1796: the first of them was erected on a pavilion of the palace of the Tuilleries. The construction was more complicated than the first. A fixed black bar, fifty feet long, was supported horizontally by four uprights. This bar carried five indicators, similar to the smaller indicators of the machines before described. Two of the upright posts which supported the horizontal bar, carried each a similar indicator: in this way the centres of the indicators were all stationary, instead of having the long indicator with smaller ones at the extremities. These seven indicators were moved by pulleys, in the usual way; and there was none of the difficulty of conveying the communicating cords through the hollow axis of the central pulley. Each of the indicators could take seven distinct positions; *viz.* for those which were supported by the horizontal bar, two vertical, four inclined, and one horizontal; and for those indicators which were supported by the upright posts, one vertical position, four inclined, and two horizontal ones. The number of combinations which such a construction can make, is  $7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7$ , which gives the astonishing number of 823,543 signals. This number, which is eight thousand times larger than that of the signals of the first telegraph, is doubtless more than sufficient: it, however, allowed them to abridge considerably the telegraphic language, and to transmit whole phrases at a time.

*The English Telegraph.*—M. Chappe's machine was known in England not long after it was set up, and two working models were made at Frankfort, and sent to England, by which the plan and alphabet became known; and its advantages were so obvious, that the British government tried various experiments on telegraphic communication, and at length lines were established from the Admiralty-office to Deal, Portsmouth, and other points of the sea-coast. These machines are upon the construction represented in *fig. 3*, not being made with indicators, like the French, to move upon centres into different positions, but with six octagon boards, each poised upon an horizontal axis, and supported in a frame in such a manner, that each can be placed vertically, and will then appear of the full size; or if they are placed edgeways, as shewn at *d*, the narrow edge alone will be presented, and this at a small distance will be invisible. The boards are turned by means of cranks, *r*, upon the end of the axles, and from these, lines descend into the cabin below, where each has a handle, which is conspicuously marked with the letter or character which will be indicated when the handle is drawn down.

By the changes in the position of these six boards, thirty-six changes may be easily exhibited, and the signal to represent any letter may be made. By certain positions, a variety of other things may be signified, according to the will of the two persons employed at the two extreme posts in making the signals. Thus, one board being in a horizontal

position, and the others shut, or in a perpendicular situation, may denote the letter *a*; two boards only being in a horizontal position may give the letter *b*; three in the same manner, the letter *c*, and so on. As there may be made as many changes with these boards as with the same number of bells, the letters of the alphabet may be made with ease, and a sufficient number of signals may be formed for extraordinary purposes.

This number of changes is sufficient; for as this telegraph is intended to convey information by representing the successive letters of each word, a greater number of changes than would express all the essential letters of the alphabet, the numerals, and three or four more signals, to signify attention, repeat, period, error, &c. would be only embarrassing, and liable to error. It is a good system to spell every word, rather than attempt to communicate entire words or sentences, as by keeping always to one system, mistakes are avoided. The communication is in itself so rapid, that it is more important to attain certainty in the operation, than to make any sacrifice for the sake of dispatch.

This telegraph was judiciously contrived to have a sufficient number of combinations, without having more than necessary. Five boards would have been insufficient, and seven more than were necessary. But there are several serious objections to it: the form renders it too bulky to admit of being raised to any great height above a building; and after all, the boards are less evident to the eye at a distance than the indicators of the French machine. The stations must, therefore, be nearer together, to render the bars of the frame visible as well as the boards. Neither can this telegraph be made to change its direction, but it can only be seen from one particular point. It was found necessary to have two telegraphs at the Admiralty, one for each line, and also at any point of the line where it branched off.

To enable the telegraph to be used at night, the first French telegraph which was set up was furnished with Argand lamps, but the English was never used in that manner. It would have required a great number of lamps; because it would have been necessary to have fixed lamps to indicate the points of the frame in which the boards work, as well as the boards themselves.

These two forms of telegraph, the French and the English, continued in use for some years. The French made frequent changes in the details of their system, though for a long time they preserved M. Chappe's machine; and when Buonaparte assumed the supreme command in France, the original machines were taken down. A number of machines were set up on various parts of the French coast, and were used in some of their campaigns: they were of a very temporary nature, and composed of the simplest materials, of masts and yards, with large balls at the end; the yards were inclined by cords, so as to effect the signals on the same principle as M. Chappe's original machine. About 1806 a new set of telegraphs was established on the whole extent of the coast of the French empire, of which the following description is given by captain C. W. Pasley, in the *Philosophical Magazine*. See *figs. 5 and 6*.

*Modern French Telegraph.*—Every telegraph consists of an upright post, R, to which are attached three arms, A, B, and C, exactly similar to each other, and each moving upon its own distinct spindle or axis. The axis of one of these arms, A, is near the head of the post R; and the distance between the centres of motion of either of the two uppermost arms, and the centre of the one immediately below it, is rather less than double the length of one arm. The highest of the three arms, A, can exhibit seven distinct

tinct positions, as is shewn by the dotted lines A 1, A 2, A 3, &c.; but the other two arms, B and C, can only exhibit six positions each, because they are hidden by the post when in a vertical position. The total number of combinations, or of distinct signals, which can be made by this telegraph, will constantly be three hundred and ninety-one; but as the arm A, when in the vertical position A 4, may appear to be part of the post, R, it is not safe to employ that position, and this will reduce the number of signals to three hundred and forty-two. As only three bodies are employed in this telegraph, it appears very superior to the Admiralty telegraphs used in England, which, by the combination of double that number of bodies, can only make sixty-three distinct signals. Captain Pasley observes, that the mechanism of the French telegraphs just described, must be either imperfect, or the men employed in working them must have been very unskilful, for the signals were made and repeated in an awkward manner, with what seemed to him much unnecessary loss of time. But these defects, it will be evident, detract nothing from its merit as an invention. In regard to the mechanical construction, he could only observe that the arms, which were painted black, and appeared solid at a distance, were made in the fashion of a Venetian blind, in order, it may be presumed, to diminish the action of the wind in bad weather. Each arm had a counterpoise of thin materials painted white, which, unless the observer be very near the telegraph, becomes invisible.

*Fig. 5.* shews the telegraph in a state of rest, the dotted lines marking the several positions in which the arms can be exhibited. *Fig. 6.* is a specimen of the telegraph at work. *Fig. 7.* shews the construction of one of the arms on a larger scale, DE being the part which is fashioned like a Venetian blind, and EF the counterpoise.

*Sir Home Popham's Telegraph at the Admiralty.*—The original telegraphs at the Admiralty, with the six boards, have been lately taken down, and a new kind substituted. It is on the same principle with the French, being an upright mast with two indicators, which move upon centres one above the other, in the manner of the last described. The mast is made to turn round on its vertical axis, so as to present its arms successively to all quarters, when required. The mechanism, which is the invention of sir Home Popham, is the best which has ever been contrived, the movements being very simple, and effected by iron spindles and endless screws, so that the indices below are certain to accompany the indicators exactly in their movements, and place them precisely in their required positions, which cannot be done by the old machinery with cords, because they are liable to expand and contract by wet or dry weather. The machinery for this set of telegraphs was constructed in the most substantial manner by Mr. Maudslay in 1816. (See *figs. 8, 9, and 10.*) LM is a tall mast of an hexagonal form, framed up from six fir planks put together at the angles, and bound by iron hoops at different places, so as to be hollow within. The lower end, L, terminates in a pivot, and the mast is retained in a vertical position by a circular collar at O, which embraces it, and is supported in the roof of the building. The two arms, PM and QR, are moveable upon centres, one at the top of the mast and the other half way down. When the arms are placed in a vertical position, they shut up within the hollow of the mast, so as to be entirely concealed; and for this purpose, two of the six sides are cut away at the upper part, so as to leave an opening through the mast of sufficient width to admit the two arms to work in it. To communicate motion to the arms, a small toothed wheel is fixed upon each arm at the centre of motion, and close to the side of the arm. The

teeth of these wheels are actuated by endless screws or worms, formed on the upper ends of the long spindles *de* and *fg*, which descend down to the bottom of the hollow mast, and have small bevelled wheels upon them, which are actuated by wheels of similar size, fixed on the ends of short horizontal spindles, which have handles, *p*, *q*, applied at the extremities. (See *fig. 11.*) By turning these handles, motion is given to the vertical spindles *d* and *f*; and by means of the endless screws upon the upper ends of them, the wheels at M and R, on the centres of the arms, are turned round, and the arms are put into any required position. But in order that the people below may at all times know exactly what positions the arms stand in, two dials, *m* and *r*, are formed on the lower part of the mast, the upper one, *m*, being for the upper arm M, and the other, *r*, for the lower arm R; and each dial has an index or hand, which turns round with a motion exactly corresponding to the motion of the arms. For producing this motion, the axle of each hand or index has a small toothed wheel, *s* or *t*, (*fig. 11.*) fixed upon it in the middle; and an endless screw is formed upon the upright spindle to work in the teeth of the wheel. The wheels upon the centre of the arms, and those upon the axes of the indices, have the same number of teeth; and as every turn of the spindles and screws will move the wheels round one tooth, the angular motion of the arms, PM and QR, and the hands, *m* and *r*, will in all cases be the same.

The dials are each divided into eight, corresponding with the eight positions in which the arms are to be exhibited: *viz.* pointing vertically; 1st, upwards; and 2d, downwards; pointing horizontally; 3d, to the right; and 4th, to the left: pointing upwards at an inclination of 45 degrees; 5th, to the right; and 6th, to the left: pointing downwards at an inclination of 45 degrees; 7th, to the right; and 8th, to the left. But of these eight positions, only the four last are made use of to represent characters; because, in the two vertical positions, the pointers enter within the mast, and cannot therefore be seen whether they are pointing upwards or downwards: the horizontal positions of the arms are reserved for the necessary signals of preparation, &c. Each arm, then, has four positions, in which it will express different signals; and these positions are all made with the pointer, at an inclination of 45 degrees from the horizontal line.

These signals either express the letters of the alphabet, or the numeral characters, according to previous arrangement, which must be made known by exhibiting a preparatory signal, before the communication is begun. The signal to prepare for receiving letters is the lower arm extended horizontally to the right; and for the numerals, both arms are extended horizontally to the left.

The upper pointer, PM, used by itself, at an elevation of 45 degrees, denotes,

- A, or 1, when pointing upwards to the left.
- B, or 2, when pointing downwards to the left.
- C, or 3, when pointing upwards to the right.
- D, or 4, when pointing downwards to the right.

The lower pointer, QR, used by itself, at an elevation of 45 degrees, denotes,

- E, or 5, when pointing upwards to the left.
- F, or 6, when pointing downwards to the left.
- G, or 7, when pointing upwards to the right.
- H, or 8, when pointing downwards to the right.

It is easy to conceive, that, by repeating all these positions with both arms exhibited together, instead of one singly, various combinations may be made, which are sufficient

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ficient to express all the remaining letters, and some other necessary signals.

The dial for each arm is double; that is, a dial is fixed at each side of the mast, and the axles of the indices or hands proceed quite through the mast, so as to have a hand at each end. These dials are not numbered exactly similar to each other, but are reversed; and the two indices on the opposite ends of the same axle, though they point in one direction, do not indicate the same numbers on the two dials; because each dial is adapted to indicate the meaning which the different positions of the arms will have, when the telegraph is viewed on that side to which the dial faces.

For when a signal is made, that arm which projects from the right-hand side, if the telegraph is examined on one side, will project on the left hand, when the telegraph is viewed on the other side.

It was before stated, that the telegraph can be turned round, so as to present its arms to any direction. This is done by the pivot, L, at the lower hand; but to hold it fast in the desired direction, a circular iron plate is placed on the floor, with holes in it; and a bolt, W, is fitted into two eyes, which are fixed to the axle of the mast. The point of this bolt drops into any of the holes in the plate, and thus holds the mast firm; but if the bolt is lifted up, to draw its point out of the holes, it can be turned round. The arms are made with boards, like Venetian blinds; and each has a piece of cast-iron at the opposite end, to counterpoise the weight, and make the arm move freely into all positions.

Since the telegraph has been brought into actual use, its great utility has been obvious; and many ingenious persons have studied the means of simplifying the methods of representing the signals, with a view to obtain the greater facility and rapidity of communication. This would enable us to avoid the danger of mistakes, by being able to repeat the whole communication several times, which at present is tedious. Many of these contrivances display great ingenuity; but it appears to us, that the defect or difficulty of communicating detailed intelligence by means of telegraphs, arises from the complicated construction of all the languages at present in use, rather than from any defects in the machines, which have been proposed to exhibit the symbols; and that to perfect telegraphic communication, it would be necessary to invent a new and more perfect language, which would be a most valuable acquisition, to facilitate all other modes of communicating ideas.

All languages originated in a very rude state of society, and were at first limited to the expression of very simple ideas. As men advanced in civilization, they found the necessity of increasing the number of their words; and to enable them to express more complex ideas, compound words were occasionally introduced; but, in all cases, knowledge must have made a considerable advance, before any arrangement or classification of words was imagined: because the necessity of any grammar would not be discovered, until the number of words were so multiplied, as to render the use of them troublesome, and liable to confusion. Before a system of grammar was established, no improvements could be made in a language, except by the addition of new words; and every such addition must have introduced new difficulties in the use of the language. Even when a system of grammar is completely established, as is now the case in all the languages of civilized nations, the number of words which were invented, or introduced without any system, is so considerable, as to prevent that perfection of expression which might be obtained, if the language had been wholly constructed in an advanced stage of society. There is no doubt but a new language might

be contrived, which, with a very small number of words, compared with any of the known languages, might express all ideas in a much more expeditious and definite manner than they do. In oral communication, this defective construction of language, and the want of precision, is little experienced, unless by those who begin to learn a foreign language; because the extreme rapidity of expression enables us to amplify and enlarge upon any subject, so as to elucidate any words or phrases which are not directly applicable to the expression of an idea to be communicated, or which are at all indefinite. In writing or reading, the deficiency of language is more observable, from the greater difficulty of expression and communication. But when we attempt to converse by signals, we experience in its full force the great complexity of language, and find that it becomes a tedious operation to represent a sentence clearly by signals, which is spoken or written in a moment; and this must continue to be the case, even if the mechanical operation of exhibiting the signals is reduced to the utmost possible simplicity. As no such scientific language as that which we hint at has been perfected, we must content ourselves to find the best means of communicating our ideas by signals, which shall indicate the letters and words of our present languages: and this may be done in two ways; first, by characters or signals, which shall either express the letters of the alphabet, or words, or, in some cases, complete sentences. The other method is to exhibit signals, which shall indicate numbers; and these numbers can be translated into words, by means of a dictionary in which every word is numbered. The telegraphs which we have described are of the former class, and we have explained the manner of using them; but the latter kind requires a greater variety of signals, because they must be capable of making as many signals as there are words in the language in which the communication is intended to be made. There is some difficulty in making a telegraph so universal as this requires, otherwise the numeral method has decided advantages, in the convenience with which it can be carried on by means of a common dictionary, alphabetically arranged, and in which every word is regularly numbered from one end to the other. In this any word can be instantly found, by its place in the alphabet; and the number corresponding to it being exhibited by the telegraph, and observed by the opposite party, he can as quickly find out the same word in the dictionary by means of its number.

The numeral method is perhaps the easiest of all others, and may be exhibited by fire and smoke in the simplest manner, without any telegraph or complicated apparatus being made for the purpose.

The meaning of a signal is ascertained by the continuance or disappearance of fire and smoke at a different place. In the day-time, the smoke on a particular hill may give notice to an observer on the next hill, that a communication is to be made: he of course will answer it by smoke, to shew that he is upon his watch. The smoke will then disappear on both hills, by a cover being placed over the fire; which, being taken off and put on again repeatedly, will shew a succession of clouds of smoke rising at proper intervals in the air. The observer notes the number of times that the smoke rises without a considerable interval, suppose three times; and he then writes down the number 3. After a more considerable interval, determined on by the parties, the smoke rises again, we will suppose four times; he writes down the number 4. He has now the number 34 to communicate by signals to the next post. At night this is done by a successive appearance and disappearance of fire.

As the number denoted by the successive appearance of  
E e 2 smoke

Smoke or fire, or firing of guns, may, if it is a large number, be liable to mistake, a learned professor in Germany proposed to shorten the numbers employed, by using a quaternary instead of the decenary arithmetic. Thus, according to his system, the units were to be placed as in common arithmetic; a figure in the next place, to the left hand, instead of denoting the number of tens, was a multiple of 4, denoted by the figure, that is, it denoted the number of fours to be expressed; in the third place, the figure denoted the number of sixteens instead of hundreds; and the fourth place of figures would be sixty-fours instead of thousands; and so on. *E. gr.* To write down 95, he placed his figures thus: 1133; the 3 in the place of units denoted 3, the next 3 denoted  $3 \times 4$ , or 12; the third figure, 1, denoted  $4 \times 4$ , or 16; the next figure, 1, denoted  $4 \times 4 \times 4$ , or 64; consequently 1133, in the quaternary arithmetic, was equivalent to  $64 + 16 + 12 + 3 = 95$  in the common decimal numeration. The advantage proposed by thus changing the figures was, that in making the signals 95, there must be fourteen firings, or appearances of smoke, which, in the other mode, is done by eight firings. In this arithmetic, a greater number than four never appears; and there is less danger in miscounting so small a number. Some of the numbers in the dictionary must be devoted to the single letters of the alphabet, as it is by means of them alone that proper names can be made out.

Mr. Edgeworth, who, we believe, first introduced the numeral system of communication, gives the following account of its advantages, in point of secrecy, over the alphabetical method, which is a great object in telegraphic communication. Although the alphabet may be varied at pleasure, and any arbitrary signs employed, yet these are possible to be deciphered by rules which depend upon the usual arrangements of letters: thus, for instance, a single character being exhibited as a word, must, in the English language, be either A or I. The proportion which exists between the number of words of one, two, three, or any greater number of letters, can be classed in catalogues, and from these the monosyllables of any cipher are easily obtained; and from the letters of these monosyllables, the letters of longer words are discovered. By similar rules, some of which are very ingenious, and depend upon the philosophy of language, any alphabetical cipher may be easily unfolded. (See CIPHER.) But these rules, excepting a few of them, are useless, when ciphers are employed to denote entire words; and the most obvious mode of discovery may be avoided, by omitting those common words which occur so frequently in every language, as *the, and, that, to,* &c.; and even supposing that, from its frequent recurrence, any word should be discovered, no progress can be made from such data, for the cipher of any word is an isolated fact which leads to nothing farther.

Suppose the knowledge of any particular vocabulary should fall into hands for which it was not intended, a slight change in the numeration, without any actual change of the figures, would prevent discovery: for instance, suppose it is settled between the parties, that 6, or any other number, is to be added or subtracted from the numbers which are exhibited before referring them to the vocabulary. The advocates of the numeral system state, that a letter can be communicated much quicker by signals which express words, than by signals which express only letters. Words may be forwarded as fast as they can be looked out in a dictionary, and even faster, whilst only an equal number of letters could have been communicated by the alphabetical mode. Another alleged advantage resulting from the use of words in the telegraphic correspondence is, that the words of the same meaning in different languages having the same number attached to each, a correspondence could be carried on from one language into

another, which, though not grammatically correct, yet would be sufficiently intelligible. Proper names must be spelled, which may easily be done, every letter having a corresponding number.

Mr. Richard Lovel Edgeworth, in the Transactions of the Royal Society of Ireland, vol. vi. p. 125, has described his telegraph, which is simple, and admits of very numerous combinations: it is intended to represent numbers to which words may be referred.

The machinery consists of four indices or pointers, each capable of revolving on a centre or axis, so as to assume different positions. The shape of each pointer is that of an isosceles triangle, of which the base is rather less than half the perpendicular. The four pointers are placed in a row, as shewn by *fig. 12*, and, as in common numeration, the right hand represents units; the second from the right, tens; the third, hundreds; and the fourth, thousands. It is easy to distinguish whether a hand moving vertically, points perpendicularly downwards or upwards, horizontally to the right or left, or to any of the four intermediate situations: this produces eight positions, which can be made by each pointer; but of these eight positions, seven only are employed to denote figures; the upright position of the hand or pointer being reserved to represent 0, or zero. The figures thus indicated refer to a vocabulary, in which all the words are numbered. Telegraphs of this kind, which are to be fixed at permanent stations, which may be seen clearly with tolerable glasses at twenty miles distance, are to be mounted on stone or wooden pillars, sixteen or twenty feet high; four of which must be solidly erected in a row; and on the top of each a moveable circle or platform turns horizontally upon a centre, in the manner of a moveable windmill head. Across the platform an axis lies horizontally, and carries the arm or pointer, fixed vertically at one extremity of the axis, whilst, at the other end, are eight handles to turn the pointer round by. The handles are fixed in their different positions by a catch or alid. By means of the platform, the pointer may be turned to any part of the compass; and as one side of it is painted black, and the other white, either side may be employed, as the colour of the clouds, or the situation of the place, may require.

In managing a correspondence by these machines, it is necessary to have certain signals established; nor are these signals merely arbitrary; it is absolutely necessary that they should be made by the two external pointers of the row, *viz.* units and thousands; or by the two internal pointers, *viz.* tens and hundreds; else they could not be repeated by the intermediate stations without confusion; because, in the middle stations, that pointer which represents thousands, when conveying a message eastwards for instance, must, when an answer is returned to an opposite direction, represent units. The same change will take place between the pointer that denotes hundreds and tens.

When any communication is to be commenced, the pointers that denote thousands and units are to be whirled round till the same is done at the corresponding station. When this signal has been answered, the person who gave it proceeds to send his intelligence. As soon as he begins, the pointer of hundreds at the opposite station is turned to 2, and kept in that position till the word is made out from the vocabulary; the pointer is then turned round to 0, or zero. The person who is speaking, when he perceives by this signal that he is understood, turns all the machines to 0, which is always to be done at the end of every word.

When all his machines are in this position, his correspondent again turns his pointer belonging to the place of hundreds to 2, to shew that he is ready to receive the intelligence, and

# TELEGRAPH.

it is to remain there till he receives another word, and so on, till all that is meant to be said is finished: the pointers of *thousands* and *units* are then to be vibrated backwards and forwards, with the points downwards, like pendulums, till the same is done at the opposite station.

If any interruption takes place on either side from a cloud, or shower, or any accident, it is to be indicated by vibrating *thousands* and *units*, with their points upwards; which signal must be repeated from the opposite station; and whoever has made the signal of interruption, must make the signal of recommencement, when he is ready to proceed. This signal is by vibrating *hundreds* and *tens*, with their points upwards, and when this is answered, (but not before,) the business may proceed. It should be observed in general, that every signal should be acknowledged by the party to whom it is addressed.

The vocabulary corresponding with the numbers denoted by this machinery is composed of a large book, *fig. 13*, with mahogany covers, framed, to prevent them from warping. Its size, when opened, is 47 inches by 21; it consists of 49 double pages, that is to say, each sheet is folded in the middle, and when it is opened forms one page.

The book is divided into seven parts by thin slips of mahogany, which serve to open it easily at each of these divisions, every one of which contains seven pages, and each page forty-nine words, No more than forty-nine words are contained in each page, because the numbers 8 and 9, and zero, are not admitted. This omission arises from the structure of the machinery, which points only to seven numbers, reserving 0 for a point of rest, at which point the hands indicate nothing. In every hundred, therefore, only forty-nine numbers are used; and in every thousand, only seven hundreds are counted. Each division of the book, separated by the mahogany rulers, contains all the efficient numbers in seven hundred. Each of these rulers projects beyond the sides of the pages, and is numbered in succession from 1 to 7; and they are so placed

below one another, as to permit the numbers on all sides of them to be seen at once, as in the figure.

When any number of thousands is pointed out, it can, by means of these rulers, be immediately selected: the series of seven pages, which one of these rulers opens, is cut, like the alphabet of a ledger, at the edge in seven divisions. By these means, the page containing the hundred which is wanted is instantly found. In the page thus obtained, the tens, from 10 to 70 inclusive, are divided from each other, so as to be instantly distinguishable, and the units under each division are in like manner easily selected.

The following is a specimen of seven lines of the first page, and though it is but one-tenth of the real size, it is sufficiently distinct. Its contents are divided into eight classes, the words in each class being numbered downwards, from 1 to 77, omitting all cyphers, or zero, and all eights and nines. When once the class required is ascertained, any number in the page can be found immediately. As for instance, the reader will easily select Class VII. N<sup>o</sup> 11, Class IV. N<sup>o</sup> 15, and so of the rest. Nothing remains to be explained but the manner in which the class in each page is pointed out by the machinery. For this purpose, before the pointers are turned to any set of figures, the pointer that represents thousands is turned to the class that is wanted, and as soon as the correspondent answers this signal, thousands is returned to 0. Then all the pointers are moved to the places which denote the figures required for any word or sentence. When the class is thus ascertained, an index, which slides on the mahogany cover of the book, is set to the column belonging to this class. When an observation is made, the number of thousands can be opened by the ruler. As soon as it is read off by the telescope, the number of hundreds is opened by the pages, where they are cut away, and the number of tens and units is seen on the page. As the pointers are moved in succession from thousands to units, the different divisions of the book can be opened as fast as the pointers are moved.

Specimen of the Vocabulary belonging to Mr. Edgeworth's Telegraph.

Common Words. Class 0.	Words less common. Class I.	Technical Terms c, n, m. Class II.	Persons. Class III.	Officers. Class IV.	Places. Class V.	Navy and Merchant Ships. Class VI.	Phrases and Sentences. Class VII.
11. A.	11. Abafe.	11. Aback.	11. Abbot.	11. Academy of Inscrip.	11. Abbeville.	11. Atlas.	11. Attend to day - at A. M.
12. Ab.	12. Abate.	12. Abacus.	12. Ackland.	12. Acad. of B. L. Paris.	12. Aberdeen.	12. Ajax.	12. ——— - at P. M.
13. Ac.	13. Abbey.	13. Abaft.	13. Acton.	13. Academy.	13. Abergavenny.	13. Albion.	13. ——— to-morrow - at A. M.
14. Ad.	14. Abbefs.	14. Abatis.	14. Acheson.	14. Account-Office.	14. Abington.	14. Africa.	14. ——— - at P. M.
15. Ae.	15. Abhor.	15. Abtomen.	15. Adams.	15. Admiralty.	15. Abydos.	15. Audacious.	15. ——— to night - at P. M.
16. Af.	16. Abdicate.	16. Abductor.	16. Adamson.	16. Agent to the.	16. Abyssinia.	16. Agamemnon.	16. ——— to-morrow night at P. M.
17. Ag.	17. Abed, Abet.	17. Abeal.	17. Adair.	17. Admiral.	17. Acadia.	17. America.	17. ——— on Monday - at A. M.

The principal objection to Mr. Edgeworth's machine is, that it would be of a vast size, and each pointer would require a man to work it. He describes, at the end of his paper, a portable machine, which is made of spars and poles jointed together, and braced by cords. We think the second kind of French telegraph, which was set up between Landau and Paris, would answer the purpose very well: it has five indicators, and the movements are made by machinery in the house below.

Major C. Le Hardy, in the Transactions of the Society of Arts for 1808, vol. xxvi. has described a telegraph which is well adapted for exhibiting signals which shall indicate numbers. It has four indices or pointers, each consisting of

a long arm, carrying a square index-board or pointer at the extremity. One of these pointers represents units; the second, tens; the third, hundreds; and the fourth, thousands. All the four indices move on a common centre by the machinery; and to distinguish them one from another, each board is placed at a different distance from the centre of motion, so that in their motion they describe four circles of different radii. The position of the arm, with respect to the horizon, is made to indicate the number which is to be expressed by each index respectively, and there are ten different positions for each, answering to the numeral characters.

To identify these ten positions, a large frame is fixed close behind the pointers, parallel to the plane of their motion; and

and this frame supports ten radial bars, which diverge from the common centre of motion. The radii are again intersected by other bars, forming four concentric arcs of circles, each corresponding in radius with the length of one of the four pointers or signal-boards. By means of the radii, the positions of the pointers, and their corresponding numbers, are read off, whilst the arcs serve to distinguish the different pointers of units, tens, hundreds, and thousands, because they always shew the length of the arms from the centre. By this machinery, 10,000 can be exhibited; and for higher numbers, there are two square signal-boards, which can be turned so as to be invisible or visible at pleasure; one represents 10,000, and the other 20,000, and both together 30,000, either of which numbers is to be added to the number shewn by the arms, according as these signal-boards are exhibited. By this addition, this telegraph can exhibit as high as 40,000.

The frame with radial bars is a good method of reading off the exact position of the arms; and it is so much more certain than trusting to the eye alone, that by its aid the arms may be shewn in a much greater number of positions; still, if each arm is distinctly capable of exhibiting ten signals, it will be sufficient for the numeral method. Mr. Edgeworth's pointers, as we have seen, were only capable of eight positions for each; and this obliged him to mutilate the system of numbers, by taking away all the eights, nines, and zero.

The dial-plate of a clock has been proposed as a model, and would make a most excellent telegraph, as it might exhibit 144 signs, so as to be visible at a great distance. The dial should only be divided into six divisions instead of twelve; and this being raised twenty or thirty feet above a building, and the indices and the dial being painted with very distinct colours, would be clearly visible. The dial, if supported on one post, might be always turned to the direction in which the information was to be conveyed.

In the Supplement to the Gentleman's Magazine for 1794, a telegraph is described, which consists of a semi-circle placed in a vertical position on a strong stand. The circumference is divided into twenty-four divisions, which are rendered visible by circular holes cut through the semi-circle. In the centre is an index, which can successively be brought to point out any division, very much in the manner of the dial of a clock. In the night-time each division is to be furnished with a lamp, and the index is made sufficiently broad to eclipse or hide any of the lamps at pleasure to which it is turned, and by this means the letters of the alphabet are to be designated.

*Mr. Garnet's Telegraph.*—Of all the proposals for making a variety of signals by the different positions of an index or pointer which moves on a centre, the following is the most certain as to the identity of the positions, and hence it admits of the greatest number of signals from each pointer. It has also a farther advantage, that there is no necessity for any frame or dials, like the three last described machines, which, as their divisions are intended to be observed at a distance, must be exceedingly large. The pointer or indicator of Mr. Garnet's machine is the same as the foregoing, and its different positions represent different characters or letters: its length should be two and a half or three feet from the centre, for every mile of distance. The distant observer can find out, and exactly read off these positions by a wire fixed across the eye-piece of the telescope with which he observes, which eye-piece turns round on the end of the tube of the telescope, so as to bring the wire to be parallel to, or correspond with the distant pointer. This is as easy to do as to look through the telescope.

The index or pointer has a small circle fixed on its axis of motion, and turning round with it. This circle is divided into twenty-four divisions, or even more, and each division is lettered with a letter of the alphabet. A fixed index is also provided, to which any letter on the divided circle can be brought by turning the pointer round, and this determines the position of the pointer. Or, instead of an index, the divided rim of the circle may be concealed in a box, with a hole at one side just sufficient to see one letter or division at a time, and then there can be no mistake in setting the pointer. The eye-piece of the telescope is to be made to turn round upon the end of the tube, and is to have a circle fixed upon it similarly divided and lettered. A fine wire is also to be stretched across the centre of the eye-piece in the focus of its lenses; and there must be likewise an index or mark on the telescope, to read the divisions of the circle on the eye-piece. If this circle be likewise enclosed in a box, having a hole to see only one letter at a time, there will be less danger of mistake.

The instrument being correctly adjusted, it is obvious that (the eye-piece of the telescope being turned round till its wire covers or becomes parallel to the distant pointer) the index on the telescope will point out the same letter on the divided circle of the eye-piece, as is indicated by the index and circle of the distant pointer: hence the two parties have the same letter or character presented to them by their respective instruments.

The idea of reading the signals by means of wires on the eye-piece of the telescope is very valuable, and promises many advantages. In intermediate stations, there is always danger of confusion in making signals to parties in both directions; because an arm which inclines towards the right when the telegraph is viewed in one direction, in an opposite direction will appear to incline to the left, and indicate a different thing: hence it is always necessary for the parties to be informed, by a previous signal, in what direction the communication is to be made, that the observers, when they see a signal made, may know whether it is intended for them, or for the next station beyond. Now when the telescope is used, if the circle of each telescope be figured to correspond with the circle of the pointer which is to be observed with it, all signals will become intelligible to any party who observes them.

The Rev. John Gamble suggested a form of telegraph, which consisted of four arms, each ten feet long, and furnished with a circular board at the end. All the four moved upon a common centre of motion, and independently of each other, so that one, two, three, or four, could be exhibited at different degrees of elevation with respect to the horizon, or with respect to each other, so as to afford a great number of signals. One of these was erected in 1803 upon one of the towers of Westminster Abbey, but has long been removed. About the time when telegraphs were first used, this gentleman published a small pamphlet, entitled "Observations and Telegraphic Experiments," which contains some good ideas.

*Nocturnal Telegraphs.*—In 1801, Mr. John Boaz of Glasgow obtained a patent for a telegraph, which effected the signal by means of twenty-five Argand lamps. These were arranged in five rows, with five in each row, so as to form a square. Each lamp being provided with a blind, with which its light could be obscured, the lamps could be made to exhibit letters and figures, the same as Dr. Hooke's characters, by leaving such lamps only visible as were necessary to form the character. The machine is described in the Repertory of Arts, First Series, vol. xvi. p. 223; and in the Philosophical Magazine, vol. xii. p. 84.

In the Philosophical Magazine, vol. xxix. Capt. Pasley has described a telegraph, which is nearly the same as Mr. Boaz's, but with six lights only; also what is called a Polygramic telegraph.

The Chevalier Edelcrantz has described a machine in the Transactions of the Society of Arts, which is for working the vanes of a telegraph with boards, like *fig. 4*, so that by merely pressing keys, like an organ, and then turning a handle, the required signals shall be made. The telegraph was proposed with nine boards instead of six; but as we consider this form of telegraph decidedly inferior to those with arms moving on centres, we shall not enter into any further description of it.

To conclude, we class the telegraphic art amongst those which are not carried to such a state of perfection as to be incapable of farther improvement: it is much to be wished that it could be so systematized, that the communication of intelligence could be effected with the same ease and certainty as by writing. We are confident of the possibility of this, from having observed the abbé Sicard conversing with his deaf and dumb pupils by making signs of the simplest nature with the hands, in which manner he could communicate his ideas on any subject with more rapidity than by writing.

TELEM, in *Ancient Geography*, a town of Palestine, in the tribe of Judah, towards the extremity of this tribe, along the frontiers of Edom.

TELEMANN, GIO. PHILIP, in *Biography*, one of the greatest and most voluminous musical composers during the first fifty or sixty years of the last century, in Germany. He was born at Magdeburg in 1681, and preceded Keiser as opera composer at Hamburg, for which city he produced thirty-five operas. His compositions for the church and chamber are supposed to be more numerous than those of Alessandro Scarlatti. In the year 1740, his overtures on Lulli's model amounted to six hundred.

This composer, like Raphael and some other great painters, had a first and second manner, which were extremely different from each other; in the first he was hard, stiff, dry, and inelegant; in the second, pleasing, graceful, and refined. Telemann, who lived to a great age, drew up a well-written narrative of his own life, in the early part of which he was an intimate acquaintance and fellow-student with Handel.

The list of Telemann's printed works, inserted in Walther's Musical Lexicon in 1732, amounted to twenty-nine; and in Gerber's Continuation of Walther, fifteen or sixteen more are specified. But still double the number of those printed were long circulated in manuscript from the music-shops at Leipzig and Hamburg.

The best account of Telemann's professional merit as a composer, was published at Hamburg immediately after his decease at 85, in 1767, by professor Ebeling, an excellent musical critic, a friend of Emanuel Bach, a man of a refined taste, sound judgment, and a perfect acquaintance with the merits and various styles of the great musicians of his country.

TELEMBO, in *Geography*, a river of South America, which joins the Patia, 8 miles N.W. of Baracoas.

TELENGUTES. See TELEUTES.

TELENTO, a town of Persia, in the province of Laristan, on the sea-coast; 10 miles S.W. of Congo.

TELEOLOGY, formed of *τελος*, *end*, and *λογος*, *discourse*, the science of the final causes of things. This is an ample and curious field of inquiry, though pretty much neglected by philosophers.

TELEPHANES, in *Biography*, a celebrated performer

on the flute in the time of Philip of Macedon. According to Pausanias he was a native of Samos, and had a tomb erected to him by Cleopatra, the sister of Philip, in the road between Megara and Corinth, which was subsisting in his time. The epitaph upon this musician, which is preserved in the Anthologia, equals his talents to those of the greatest names in antiquity.

“Orpheus, whom gods and men admire,  
Surpass'd all mortals on the lyre:  
Nestor with eloquence could charm,  
And pride, and insolence disarm,  
Great Homer, with his heav'nly strain,  
Could soften rocks, and quiet pain:—  
Here lies Telephanes, whose flute  
Had equal pow'r o'er man and brute.”

Telephanes was closely united in friendship with Demosthenes, who has made honourable mention of him in his harangue against Midias, from whom he received a blow in public, during the celebration of the feast of Bacchus. As this was a kind of musical quarrel, we shall relate the cause of it.

Demosthenes had been appointed by his tribe to furnish a chorus, to dispute the prize at this festival; and as this chorus was to be instructed by a master, Midias, in order to disgrace Demosthenes, bribed the music-master to neglect his function, that the chorus might be unable to perform their several parts properly before the public, for want of the necessary teaching and rehearsals. But Telephanes, who had discovered the design of Midias, not only chastised and dismissed the music-master, but undertook to instruct the chorus himself.

TELEPHIASTRUM, in *Botany*, Dill. Elth. 375, so called by Vaillant, from its resemblance to *Telephium*. See TALINUM.

TELEPHIOIDES, Tourn. Cor. 50. t. 485. Dill. Elth. 377. t. 282. See ANDRACHNE.

TELEPHIS, in *Ancient Geography*, a town of Asia, in Greater Armenia, situated in the vicinity of the river Phasis.

TELEPHIUM, in *Botany*, a name adopted from Dioscorides, whose *τελεφιου* the plant we are about to describe was supposed, by Imperato, Clusius, and most authors, to be. Dr. Sibthorp however satisfied himself that the plant of Dioscorides was *Cerintbe minor*, and possibly also the *aspera* of Willdenow. To this conclusion he was led, first, by the authority of the famous old manuscript with drawings, at Vienna; and next, by observing that *C. minor* is particularly common in Greece among vines in the spring, as well as in other cultivated ground, as Dioscorides relates of his *τελεφιου*. The yellow colour of the flowers also answers to his description, which our *Telephium*, in that point, does not, nor did Dr. Sibthorp observe the latter in any part of Greece.—Linn. Gen. 149. Schreb. 201. Willd. Sp. Pl. v. 1. 1506. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 173. Juss. 313. Tourn. t. 128. Lamarck Illustr. t. 213. Gært. t. 129.—Class and order, *Pentandria Trigynia*. Nat. Ord. *Holeraceæ*, Linn. *Portulacæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of five oblong, obtuse, concave, keeled leaves, the length of the corolla, permanent. *Cor.* Petals five, oblong, obtuse, erect, tapering downwards, inserted into the receptacle. *Stam.* Filaments five, awl-shaped, shorter than the corolla; anthers incumbent. *Pist.* Germen superior, triangular, acute; style none; stigmas three, acute, spreading. *Peric.* Capsule short, triangular, of one cell with three valves, and a central unconnected receptacle, half as long as the capsule. *Seeds* numerous, roundish-kidney-shaped.

Eff. Ch. Calyx of five leaves. Petals five, inserted into the receptacle. Capsule with one cell, three valves, and many seeds.

1. *T. Imperati*. Green Orpine. Linn. Sp. Pl. 388. Willd. n. 1. Ait. n. 1. (*T. legitimum*; Clus. Hist. v. 2. 67. Ger. Em. 520. *Telephio di Dioseoride*; Imperat. Hist. Nat. 662.)—Leaves alternate.—Native of Switzerland, Italy, and the south of France. A hardy perennial, kept in our botanic gardens, flowering in summer. Numerous decumbent, round, herbaceous, leafy stems, a span long, but slightly branched, spring from the crown of the root, spreading in all directions. The leaves are scattered, nearly sessile, obovate, entire, smooth, glaucous, rather succulent, an inch long, more or less. Cymes terminal, solitary, convex, of numerous smooth flowers, with white, or pale flesh-coloured, petals.

2. *T. oppositifolium*. Barbary Orpine. Linn. Sp. Pl. 388. Willd. n. 2. (*T. myosotidis foliis, amplioribus, conjugatis*; Shaw Afric. n. 572. f. 572.)—Leaves opposite.—Found by Shaw in Barbary. Nothing is known of this species but from his rude figure, and short description. The leaves are elliptic-oblong, above an inch in length; the lower ones stalked. Tops of the flowering branches recurved, as in the *Heliotropium*. Petals small. Capsules of three valves, with many seeds; so that there seems no doubt of the genus.

TELEPHIUM, in Gardening, furnishes a plant of the small hardy perennial kind, of which the species usually cultivated for garden use is the true orpine (*T. imperati*).

*Method of Culture*.—This plant is increased by sowing the seeds in the autumn or spring, in dry light mould, either where the plants are to remain, or in beds to be afterwards planted out. They appear in the spring, when they should be kept clear from weeds, and they will flower the following year.

It is also capable of being increased sometimes by offsets, slips, or cuttings, planted out in the spring season.

It likes a dry light soil, in which it grows best and lasts longest. The plants afford variety in the common borders and clumps when placed in the fronts of those parts.

TELEPHIUM, a malignant dangerous ulcer. The term is derived from Teleplus, who was wounded by Achilles, and whose wound, it is said, became before he died a disease of the above kind.

TELEPHORUS, in Entomology, the *NECYDALIS Cæruleus*; which see.

TELESCOPE, from *τελε*, at a distance, and *σκοπία*, I see, is an optical instrument that enlarges the visual angle subtended by a distant object, and thereby is said to magnify it, so as to render it visible to the eye of an observer. This property of making distant objects appear close to the eye, never fails to excite the surprise of every one who looks through a telescope for the first time; but few, comparatively speaking, have their curiosity fully gratified, as it regards the means by which this wonderful phenomenon is effected. They are told, that the tube through which they look, contains magnifying glasses, or polished specula, which, by a peculiar arrangement, produce the surprising effect they witness, and there the explanation usually ends; but it is our province to give our readers a better account of this astonishing instrument, which we propose to do in a systematic manner, first by giving a short history of its invention and improvements; secondly, by giving a popular explanation of the theory of the dioptric construction, including the doctrine of aberrations; thirdly, by explaining the theory of the cata-dioptric construction; fourthly, by describing the most approved instruments, with reference to

the drawings that represent their figures on their respective stands; fifthly, by shewing how their magnifying powers may be measured by dynameters, and varied by different arrangements; and lastly, by exemplifying their uses in measuring small angles and their corresponding terrestrial distances. But before we proceed further with this subject, we must request our readers to peruse the articles ABERRATION, CATOPTICS, DIOPTRICS, LENS, MIRROR, REFLECTION, REFRACTION, and SPECULUM, in the preceding volumes of our work, in order that we may not have occasion to repeat what would otherwise have been necessary to be introduced in this place, to render our account sufficiently full, particularly in that part of it which relates to the theory of single lenses.

1. *The History*.—The invention of the telescope, which was one of the noblest that modern ages can boast of, has enabled man to raise his eyes far above the surface of the globe he inhabits, in search of worlds that were invisible to the unassisted eye; and the more perfect his instrument is made, the more celestial bodies he discovers scattered through the infinitude of endless space. Whether this invention was casual, or the offspring of ratiocination, cannot perhaps be positively affirmed from any existing document; but the probability is, that it was in a certain degree casual: lenses of both the concave and convex formation were used separately to assist the human eye, antecedently to the construction of any telescope; and the general belief is, that some accidental placing of two lenses, one convex and the other concave, of different focal lengths, at such distance from each other, that the rays transmitted through them formed a picture on the retina of the eye, led to the discovery that they possessed the wonderful property of rendering a distant body apparently more large, and consequently more near, than it will appear to the unassisted eye, or to an eye using any single lens whatever: this discovery, once made, would obviously lead to the construction of an instrument, in which this simple combination of two lenses would be the basis.

The honour of having constructed the first telescope, which was no doubt of the dioptric or refracting sort, (from *διωπτερον*, a perspective instrument,) has been attributed to various inventors, several of whom may have been equally entitled to the claim of originality, though only one can be considered as the first inventor. We profess not to be in possession of better information on this subject than our predecessors were, and therefore shall satisfy ourselves with the enumeration of those persons who appear to us worthy of being put on the list of competitors for the honour of this noble invention. Mr. W. Molyneux has asserted, in his "*Dioptrica Nova*," that our countryman Friar Bacon well understood the nature of all sorts of optical glasses, and how to combine them so as to form some such instrument as the telescope; and Samuel Molyneux, the son, has affirmed, that not only the invention but construction of a telescope is fairly attributable to Bacon, as may be collected from various Latin phrases in his *Opus Majus*; and Dr. Jebb, who edited this work, adduces a passage from Bacon's manuscript, to prove that he actually applied telescopes to astronomical purposes so long ago as in the 13th century; the friar having died in the year 1294.

The passages to which Mr. Molyneux refers, in support of Bacon's claims, occur in his *Opus Majus*, p. 348, and p. 357. Jebb's ed. 1733. The first is as follows: "Si vero non sint corpora plana, per quæ visus videt, sed spherica, tunc est magna diversitas: nam vel concavitas corporis est versus oculum vel convexitas:" whence it is inferred, that he knew what a concave and convex glass was. The second is comprised in a whole chapter, where he says, "De visione

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visione fractâ majora sunt; nam de facili patet per canones supra-dictos, quod maxima possunt apparere minima, et e contra, et longe distantia videbuntur propinquissime, et e converso. Nam possumus sic figurare perspicua, et taliter ea ordinare respectu nostri visus et rerum, quod franguntur radii, et flectentur quorsumcunque voluerimus, ut sub quocunque angulo voluerimus, videbimus rem prope vel longe, &c. Sic etiam faceremus solem et lunam et stellas descendere secundum apparentiam hic inferius, &c.:" *i. e.* greater things than these may be performed by refracted vision; for it is easy to understand by the canons above-mentioned, that the greatest things may appear exceeding small, and on the contrary: also that the most remote objects may appear just at hand, and on the contrary: for we can give such figures to transparent bodies, and dispose them in such order with respect to the eye and the objects, that the rays shall be refracted and bent towards any place we please; so that we shall see the object near at hand or at a distance, under any angle we please, &c. So that thus the sun, moon, and stars, may be made to descend hither in appearance &c. Mr. Molyneux has also cited another passage out of Bacon's Epistle ad Parisiensem, of the Secrets of Art and Nature, cap. 5. to this purpose: "Possunt etiam sic figurari perspicua, ut longissime posita appareant propinqua, et e contrario: ita quod ex incredibili distantia legeremus literas minutissimas, et numerarem res quantunque parvas, et stellas faceremus apparere quo vellemus:" *i. e.* glasses or diaphenous bodies may be formed, that the most remote objects may appear just at hand, and contrarily; so that we may read the smallest letter at an incredible distance, and may number things though never so small, and may make the stars appear as near as we please.

Dr. Smith, however, who must be considered as having been a competent judge of this subject, was unwilling to allow the inference, that Bacon actually made a telescope, and conjectures that he only conceived in his mind how such an instrument might be constructed; which, by the bye, is still allowing the invention, though not the construction, to have been his. But be this as it may, we find no further notice taken of any such instrument as a telescope until about the year 1560, when John Baptista Porta, a Neapolitan, is said by Wolfius to have made a telescope; but the description he gave of his invention in his *Magia Naturalis* is so defective, that Kepler declared it unintelligible; neither does it appear that this telescope was used in any celestial observation. Soon after this time, *viz.* in the year 1579, according to the account of Thomas Digges, in his *Stratificos*, his father, Leonard Digges, had learned from a manuscript book of the learned Bacon, how to discover objects at a distance, by perspective glasses set at due angles, when the sun shone upon them; but it is not evident whether the construction resembled that of a telescope or of a camera obscura, nor whether it was of the dioptric or catoptric kind.

According to Descartes, James Metius, while amusing himself with making mirrors and burning-glasses, happened to look through two lenses, one concave and the other convex, placed by accident at a proper distance from each other, and thus discovered the property that such a combination of glasses possesses of shewing objects at a distance; this discovery is said to have been near the end of the 16th century. The same discovery has been also attributed to John Lipperheim, a maker of spectacles at Middleburgh; but Borellus, in his book entitled "*De vero Telescopii Inventore*," makes Janfen, or Hansen, (Zacharias Joannides,) another maker of spectacles at the same place, the real inventor of the telescope in the year 1590; and there seems to remain

little doubt but that Janfen was entitled to the honour. The account is, that after having arranged the glasses in a tube, this ingenious mechanic hastened to present it to prince Maurice, under a persuasion that it would benefit him in his wars; but the secret soon became public, and Lipperheim immediately copied the invention. This first telescope magnified about fifteen or sixteen times, and its inventor viewed with it the spots of the moon, the body of Jupiter, and even saw some small stars above and below his disc, which appeared to move round him, and which therefore must have been his satellites. From this source, it is supposed that Metius gained his information, as well as Cornelius Drebell, of Alenmaer in Holland, who afterwards made similar instruments. We may also mention Francis Fontana, an Italian, as one who claimed the honour of this invention in the year 1608; but from what we have already said, of Janfen particularly, he cannot be considered as the first inventor, though it is possible that the report of such an invention having taken place might incite him to devise the means of effecting a similar contrivance. This, it is generally understood, was the case with the famous Galileo, who, when professor of mathematics at Padua, heard it reported at Venice, in the year 1609, that a Dutchman had presented count Maurice of Nassau with an optical instrument, which had the property of making distant objects appear as though they were near; but notwithstanding about twenty years had elapsed since the invention, the means used for producing the wonderful effect were not known; and Galileo, on his return to Padua, in a very few days not only contrived but constructed a telescope, which he presented to the doge Leonardo Donati, and to the senate of Venice, together with an account of the construction and uses which the instrument might be applied to, both by sea and land; for which service it is well known that his stipend as professor was thenceforth tripled. Among other discoveries that were made with Galileo's telescope in the heavenly regions, the four satellites of Jupiter were found by him to revolve round this planet in their respective periods, and were called the *Medicean stars*, in honour of the house of Medici. This discovery took place early in the year 1610, and Galileo, pursuing his favourite study till March, published at Venice his "*Nuncius Sidereus*," containing an account of all his discoveries, and dedicated it to Cosmo, the grand duke of Tuscany, who, in a letter written by himself, invited the astronomer to quit Padua for an increased stipend, without the labour of a lectureship. The first telescope which Galileo constructed had only a power of three times; his second was six times more powerful; and his third magnified thirty-three times, which, at so early a date, was no contemptible instrument.

Hence Galileo, though evidently not the first maker of a telescope, has been considered as entitled to all the merit that is due to such a noble invention, seeing he had no model before him, nor instructions how to proceed in the accomplishment of his ingenious work. But though Galileo was successful in the construction and uses of his telescope, which was of the refracting sort, with a concave eye-glass, as we shall shew presently, yet it remained for that sagacious mathematician Kepler to explain, on philosophical principles, the *rationale* of that construction. It was he who first explained the nature and effects of both the converging and diverging rays of light, after passing through the respective lenses, and who demonstrated the principles by which new arrangements might be made in the glasses, that would produce a superior instrument. He shewed that in small obliquities of incidence, the angle of incidence exceeds the angle of refraction about three times.

He also first proved, that in a plano-convex lens, parallel rays are made to converge to a point which is distant from the lens just the diameter of the sphere of convexity; and that, if both sides of the lens are equally convex, this point will be at the centre of the circle of convexity. It remained however for Cavalleri to discover and to prove, in cases where the radii of curvature of the two sides of a double-convex lens are unequal, that as the sum of both the diameters is to one of them, so is the other to the distance of the focus: and it may be proper to notice here, that the same rules are applicable to concave lenses, except that the focus is at the contrary side of the glass.

It is remarkable, however, that Descartes, the pupil of Kepler, makes no mention of his tutor's improvements, in the art of constructing a telescope, having been carried into execution for several years after Galileo's was brought into use. It was not till the year 1630, that Scheiner describes, in his "Rosa Urina," the plan of substituting a convex instead of a concave eye-glass, as suggested by Kepler, to be used for astronomical purposes, where the inversion of the object is a matter of no importance, but where the increased field of view is of material consequence. The same mechanician soon after adds a second convex glass to his eye-tube, by means of which the objects become erect, which addition was no improvement to the vision, but rather a detriment; and after him, Rheita gave an erect position to objects, by using three similar lenses in the eye-tube instead of two, which greatly improved the vision, without other detriment than the loss of a little light: and because Rheita's telescope was adapted for viewing objects on the earth, as well as in the heavens, it was distinguished by the name of the *terrestrial* telescope, by way of distinction from Scheiner's *astronomical* one. In both these telescopes, as well as in Galileo's with a concave eye-glass, the power is estimated from the focus of the object-glass divided by the focus of the eye-glass, as will be seen hereafter.

The study of dioptrics now became general, and several improvements were offered by different individuals in the construction of the refracting telescope; but among the real improvers must be placed the very ingenious Huygens, who, being well acquainted with the aberration of the rays of light arising from the spherical figure of the glasses, contrived a better arrangement of the eye-glasses than had before been devised. It was however very soon found, that the power of a telescope of any of the preceding constructions, could not be increased by shortening the focus of the eye-glass alone, beyond certain limits, without introducing great indistinctness, arising from the spherical aberrations; and that the best mode of gaining power, without diminution of light and distinctness, is an increase of the focal length, without much increase of aperture of the object-glass; and a little experience shewed, that it is necessary to increase this length in the duplicate ratio of the proposed increase of power: *i. e.* in order to magnify *twice* as much, the focus of the object-glass must be made *four* times as long as that of another telescope that has the same light and distinctness; and for any other power in a similar proportion. The consequence of this discovery was, that different makers began to vie with each other, with respect simply to the length of their telescopes: among these may be mentioned Eustachio Divini at Rome; Campani at Bologna; sir Paul Neille, Mr. Reive, and Mr. Cox, in England; and in France, Borelli and Auzout. The last-mentioned mechanician succeeded in grinding an object-glass of the astonishing length of 600 feet; and it is said, that Hartsoecker made them even longer than this.

It will here occur to the reader, that tubes of this enor-

mous length, if practicable, could not be manageable by an observer; and hence we find, that these very long object-glasses were fixed on the top of long poles, or to growing trees, and so contrived as to be capable of adjustment for the axis of vision when turned to different altitudes, agreeably to the required position of the remote eye-glass.

But while the length of the telescope was thus inconveniently increased, and the trouble of making good observations therewith proportionably augmented, it became a question to determine in what proportion the aperture might be enlarged with the increase of focal length of the object-glass. Auzout wrote a paper, and delivered it to the Royal Society in the year 1665, in which he affirmed, that the diameter of the object-glass ought always to be in a subduplicate ratio of its focal length, or nearly so; and accordingly drew up a table of apertures suitable for all focal lengths, from 4 inches to 400 feet: upon which Dr. Hooke very properly remarked, that the same glass may have its aperture advantageously enlarged or diminished, according to the quantity of light proceeding from the object viewed.

While powerful telescopes were thus obliged to be unmanageably long, and obtained the name of *aerial* telescopes, from the circumstance of their having no tubes to be inclosed in, the immortal Newton had his penetrating mind occupied with meditated improvements on the figure and arrangement of lenses, and proceeding, as he always did, on rational principles, discovered, from the elongated and coloured spectrum formed by rays of light passing through a triangular prism, and from experiments calculated to investigate the cause of such an oblong form and coloured appearance, that light is not homogeneous, and that different rays are differently refrangible, when transmitted through the same medium. This grand discovery presented difficulties standing in the way of the improvement of the refracting or dioptric telescope, apparently much greater than those which had previously been discovered, as arising only out of the spherical figure of the glasses; and all hope of success in making short telescopes of great power, and yet with sufficient light and distinctness, but without an admixture of coloured rays, was given up.

Yet to a mind like Newton's, it naturally occurred, that what could not be practically effected by refraction, might probably be accomplished by reflection of the rays of light into a focus, where, as there would be no separation of the colorific rays by a refracting medium, there would be no colour nor elongation of the focal point, arising from any other aberration, than what might be caused by the figure of the reflecting surface; he therefore abandoned his proposed plan of grinding lenses after the figure of some of the conic sections, (for which sir Christopher Wren contrived a machine,) to avoid the effects of spherical aberration in dioptric telescopes, and turned his mind to the improvement of catoptric or rather cata-dioptric telescopes, which had been previously proposed to Descartes by Merenne, and actually constructed by James Gregory of Aberdeen. The composition for the best metal for reflection, and the mode of grinding and polishing, as proposed and practised by Newton, we have already detailed under our article *SPECULUM*; but as reflecting telescopes have been constructed differently, we will here introduce a short account of the respective differences, before we resume the remaining narrative of the improvements in dioptric telescopes. The first construction of the reflecting telescope was the Gregorian, and most of the portable reflectors continue to be of this construction at the present day: its large speculum is concave, perforated at the centre, and placed at the interior end of the large tube; and the small reflector is also concave, placed

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placed opposite the central hole of the large one, in such an adjustable manner, that the rays, after a second reflection, *cross* one another, and come to the eye-glass in such a way, that an *erect* picture of the object, or rather of the image of the object, is formed on the retina of the eye. In this construction, it has been supposed that the figure of the large concave speculum ought to be truly parabolic, because this is the figure recommended by Newton for his construction; but this conclusion is erroneous; for it is the joint effect of both the specula that must be adverted to in their respective figures, so that the rays may come without aberration to the eye-glass after *both reflections*; and in order to produce this joint effect, the curve of the large speculum must be somewhat *more* than parabolic, *viz.* approaching to hyperbolic, because the small speculum is also concave, and has its separate aberration.

In the Newtonian construction, the large speculum is, or ought to be, truly parabolic, and the small one *plane*, set diagonally at an angle of  $45^\circ$ ; so that the rays, after the second reflection, come to the eye-tube on the *side* of the large tube, and near its aperture: the rays do not cross here, but come to a focus at the eye-glass, where the object is represented inverted and well defined, as well as bright; for when the rays fall obliquely on the small reflector, they are almost all reflected without dispersion, which is an advantage that this construction has over the Gregorian. When the Newtonian telescope was proposed to Huygens, he had the candour to acknowledge, which proved to be the fact, that there would not be that limit to the aperture of a reflector, that is prescribed by natural necessity to that of a refractor, and that the power as well as light may be made far to exceed those of the latter.

The next construction of a reflecting telescope was that of Cassegrain, described in the Philosophical Transactions of the year 1672. This differs from the Gregorian only in this particular, that the small speculum is *convex*, and the focus of the large or concave one may be longer than is required in the other, for the same length of tube; the rays do *not cross* after the second reflection, and consequently the object is seen inverted, as in the Newtonian; but here the curve of the large speculum is less than parabolic, in order that the joint effect of both the reflections may be an exemption from aberration. This adjustment of the figures of the metallic surfaces is best understood and accomplished by the first-rate opticians, and is but little known to mere theorists.

Of the Herschelian telescope we shall only say, in this place, that it differs from the Newtonian in no other respect, except in its size and powers, and that the second reflector is dispensed with, the length of the tube being equal to the focal distance of the large speculum, and the head of the observer being consequently placed at the upper end or aperture of the tube; so that, in this construction, as little light as possible is lost from the single reflection, the principal loss being that which is intercepted, on its entrance into the tube, by the head of the observer. The parabolic curve for the face of the speculum is equally proper for the Herschelian as for the Newtonian telescope.

From these short historical notices it will be seen, that Merfenne first suggested the hint for constructing a reflecting telescope, which must have been before the year 1651, when his *Catoptrics* were printed; or, according to Descartes' third and twenty-ninth letters, written in 1639, though not published till 1666, before these letters were written. Gregory, who might or might not have seen Merfenne's suggestion, published an account of his construction in his "*Optica Promota*," in the year 1663; but as he was not

a skilful mechanic himself, it is understood that his telescope was but an indifferent one, and that the theory of his construction was not completely realized to his wish. At this juncture, sir Isaac Newton, who was a good mechanician, as well as mathematician and experimental philosopher, took the subject into his consideration, and, by his successful labours, prevented the invention from falling into oblivion. His proceedings met with interruption from the occurrence of the plague; but about the end of the year 1668, he began his experiments on speculum metal, and, in the year 1672, produced two small reflecting telescopes. In these, the large specula were ground into a spherical concave surface, as being the easiest to execute; but he was aware that the parabolic curve, recommended by Gregory, would be preferable, when it could be accomplished by mechanical contrivances, which he judged to be within the reach of human ingenuity. The result of these labours was communicated to the Royal Society of London; and, through the medium of their secretary, Mr. Oldenburgh, to the ingenious Huygens, who testified his approval of this construction in an account which was published in the *Journal des Sçavans* for the year 1672: and in this way, nearly the whole of Europe became acquainted with the Newtonian construction. In the mean time, Cassegrain, a Frenchman, who had varied Gregory's construction, by substituting a convex instead of a concave small speculum, as we have already stated, in the same journal (*des Sçavans*, 1672), contested the honour of having been the first improver of the original Gregorian telescope; which claim drew from Newton several objections to Cassegrain's construction, that will indeed apply equally to the Gregorian. We have, however, recently witnessed in captain Kater an advocate for Cassegrain's telescope, in preference to that of Gregory, (see *Phil. Transf. of London*, 1813 and 1814,) principally with respect to the brightness and distinctness of objects respectively seen by them; and his conclusion is, that much of the light is dissipated by the *crossing* of the rays in the *focal point*, which is a doctrine waiting for confirmation. In Cassegrain's telescope, the picture of the object itself is viewed by the eye; but in Gregory's, the picture of the image representing the object at the point of crossing is only viewed; which circumstance constitutes the essential difference in the two constructions: and it is very probable that the light proceeding from the image of an object may not be so vivid as that proceeding from the object itself, of which the image may be considered as a less enlightened representation.

It is remarkable that no improvement was made on Newton's small telescopes till about the year 1723, when Hadley presented to the Royal Society a reflecting telescope of Newton's construction, in which the focus of the speculum was 10 feet  $5\frac{1}{4}$  inches. Though Newton's were only six inches long each, they were compared to the six-foot refractors, such as were made at that time; but what must have been the public feeling, when Hadley produced his enlarged instrument! This was found at least equal in power to the famous Huygenian refractor of 123 feet; at least, its power and distinctness were equal, though the light was not quite so bright.

Since Hadley's time, the reflecting telescope has experienced considerable improvements from the labours of Mr. Short, Mr. Mudge, the Rev. John Edwards, Dr. Herschel (now sir William Herschel), and others who are our own contemporaries.

But while reflecting telescopes were undergoing their various improvements, and were superseding the use of the long refractors, the idea of correcting both the spherical and

prismatic aberrations was not abandoned. We have already asserted, under our article *CIRCLE*, that Chester More Hall, esq. of More Hall in Essex, so long ago as in the year 1729, constructed telescopes of different glasses; some of which have been preserved, and found, on examination, to be of the achromatic kind, though not known by this designation. But as we are not in possession of any record respecting the invention and mode of constructing such telescope, we do not presume to say that this was the archetype of the modern achromatic instrument; and, therefore, we do not consider it as detracting from the merit of the philosophic optician, who afterwards deduced the principles of the invention from accurate and ingenious experiments, and made known his successful application of them at a time when his claim to originality might have been disputed, if the prior invention had been then divulged.

It was not till about the year 1747 that Euler, not knowing what had been done by Hall, and profiting by a hint that had been suggested by sir Isaac Newton, conceived the plan of constructing an object-glass of two such materials, of different refractive powers, as might counteract, by repeated refractions, the dispersion of the differently refrangible rays, and thus bring all the rays into one focal point, so as to admit of a highly magnifying eye-piece. Accordingly two object-glasses were so inclosed in a box, as to include clear water between them, to be used instead of a single lens; and though the experiment failed of success, the memoir, written by Euler on the occasion, attracted the attention of the late Mr. J. Dollond, mathematical-instrument maker of London, who soon after set about making experiments, as Newton had done, to ascertain if the refractive and dispersive powers of various transparent substances are in a constant ratio, with the view of compounding, which he at length effected, an object-glass that would bring the rays of light transmitted through it to a focal point, without the prismatic aberration.

In the memoir which Euler had written, and which was published in the Berlin Memoirs of 1747, he assumed that the indices of refraction might be expressed by the powers of a certain invariable root, and that the exponents of those powers are proportional for the different rays of light passing through different media. This paper coming to the hands of the ingenious Dollond, excited his attention; and in the year 1753 he addressed a letter to James Short, "concerning a mistake in M. Euler's theorem for correcting the aberrations in the object-glasses of refracting telescopes;" which letter was published in the Philosophical Transactions of the same year; the object of which was to prove that Euler had assumed a hypothesis, as the basis of his calculations, which was contrary to both reason and experiment, or, as Short observes in his accompanying letter, "contrary to the established principles of optics." To this Euler replied, and maintained that his optical principle was a true law of nature; but the practical test of its truth was wanting, the use that it was intended to be put to.

In 1754, the Swedish geometer Klingentier took up the subject, which now attracted the attention of various mathematicians, and attempted to prove that the Newtonian principle, opposed to Euler's, is in some extreme cases irreconcilable with natural phenomena, and therefore ought not to be received as a law of nature. Dollond, therefore, thus opposed, had recourse to actual experiment, agreeably to Newton's plan of philosophizing; and, rejecting the proposal of putting water between two menisci, with a view of correcting the prismatic aberrations by a number of refractions, proceeded to institute a regular series of experiments, in order to determine what could be done by the opposite

refractions of different diaphanous media; and as these experiments were the foundation of all the improvements that have followed in the construction of colourless, or what Dr. Bevis denominated *achromatic*, object-glasses of a refracting telescope, we shall here introduce a summary account of them.

In the first place, Dollond contrived to form a hollow inverted pyramid with two opposite sides of glass, as in *fig. 1, Plate XXIV. Astronomical Instruments*, and placed in an inverted position, within a triangular and equilateral prism of glass, to rest as represented in the figure. The vessel was then filled with clear water, and a ray of light made to pass through both the water and glass prism: the angle at the junction of the glass plates, closing the vessel, was capable of enlargement or diminution; and the glass sides were made to recede or approach, until an object seen through the water and glass prism was in its true place, *i. e.* until the refraction of the water balanced the opposite refraction of the glass. The result of this experiment proved contrary to what had been expected from Newton's experiments, *viz.* an external object seen through this compound prism was fringed with colours. But to be quite sure that there was no deception in the appearance, a glass prism, formed to an acute angle of only 9 degrees, was substituted, which was also more convenient for the experiment, and then the vessel was closed, as in *fig. 2*, until the opposite refractions balanced each other as before; but still the object viewed through the compound prism was tinged with the prismatic colours. The mean rays in these trials proceeded in a straight line, after quitting the second wedge of water; but the extreme rays were deflected, or turned respectively out from exact parallelism.

After having thus ascertained that equal and opposite refractions of glass and water will not destroy the colours, the author varied the experiment, by altering the wedges of water, till he found that the refraction occasioned by the water must be to that occasioned by the glass as 5 : 4, before the colours will disappear. The next step was to pursue the proportions thus ascertained, in the construction of an object-glass containing water; but after uniting a deep and double convex lens of pure water with a concave one of glass, the object seen through the telescope with this compound object-glass was indeed free from colour, but by no means so distinct as was desired, and consequently the spherical aberration yet remained. This telescope was made in 1757, and served to prove that the separation of the extreme rays, or what has since been called the *dispersive power*, in the case of an union of glass with water, is *not proportioned to the mean refraction*; as sir Isaac Newton had asserted it to be, in the same experiment (see Newton's Optics, p. 112, 3d edit.): consequently the idea must now have occurred of trying other diaphanous substances with different refractive powers, to see what the *dispersion* would be in them. After an interval of some time, during which different kinds of glass were procured, the ingenious and persevering artist found, for the first time in the year 1757, that the *dispersive power* of the crystal or white flint-glass was *greater* than that of the English crown-glass, and also that the power of the latter was very similar to that of the Venice straw-coloured glass. He determined, therefore, to try a wedge of flint-glass, and another of crown-glass, formed to different angles, as in *fig. 3*, until, when reversed, their opposite refractions were equal; which equality took place, when their angles were respectively 25 degrees and 29 degrees; in which case, the sines of half the angles, or the indices of their refractions, were 216 : 250, or nearly as 19 : 22. But though the direction of the pencil of light

was

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was now unchanged, as was expected, the compound rays had not all the same divergence. The shape of the wedges was then modified, so that the colours disappeared by a due opposition of their respective dispersions; and when this was effected, the refractive powers of the two wedges were found nearly  $2 : 3$ ; and, consequently, the sines of half their angles,  $19 : 33$ ; which ratio is nearly  $4 : 7$ . In this situation of the wedges, the rays which enter parallel emerge also parallel, while they are equally deflected from the points of emergence. These results may be obtained very strikingly by an union of four wedges, or pair of compound wedges, as represented in *fig. 4*, where the crown receives the rays first, and where the rays, at equal distances from the central line of union, meet always at the same point. This, therefore, pointed out the construction of a double object-glass, such as is represented in *fig. 5*, in which the convex curve of the crown-glass is to the concave curve of the flint of given qualities nearly as  $7 : 4$ , or nearly in the ratio of their respective dispersive powers. But to avoid the too great effect of spherical aberration, arising from the quick curves, the single convex lens of crown-glass was made into a double convex, with double the radius of convexity; and also the single concave might be made double, with a similar increase in its radius of concavity, to answer the same purpose as the combination last described. But, in this case, the convexity of one glass would not fit the concavity of the other, so as to come nearly in contact throughout: it appeared necessary, therefore, that while the internal faces fitted each other, the external concavity of the flint-glass should be eight times less, or of longer radius than before proposed, in order to maintain the balance of opposite dispersions; or otherwise, as in *fig. 6*, if the double concave faces of flint-glass remain as above stated, the front convexity of the crown-glass must be five-sevenths of the due curvature, as proposed above; while the inner surface remains in perfect contact with the concavity of the other. In these combinations, the superior refraction of the convex lens, being diminished one-third part by the opposing refractive power of the concave lens, required this convex to be ground and polished to a focus three times shorter than would be required for the same lens used singly; and the option, that is afforded the artist, of varying the curves at pleasure, provided the combined effect of the compound lens shall produce a proper effect in banishing the colours, admits of a modification that will correct the spherical aberration also, in a great measure. Telescopes on this achromatic principle were first constructed in the year 1758, and when their merit was once acknowledged, the great number that the inventor and his successors have had occasion to make, both for sale among their customers, and for exportation, have afforded them the easy means of trying a variety of concave and convex glasses together in succession, before they were finally paired; so that their success not only originated in, but has been continued by, the aid of experiments, which no one but the Dollonds has had the power of executing to so great an extent. See DOLLOND.

Nor was J. Dollond's success confined to the manipulation of object-glasses alone; he had previously contrived and constructed the improved system of eye-glasses, in which object he was followed by his son-in-law, Ramsden.

This improvement consisted in extending the usual number of eye-glasses to five, so systematically arranged, that by dividing the errors of spherical aberration, they reduced their amount to an inconsiderable quantity.

The value of this arrangement will be best understood from his own words, which we will extract from his letter, published in the Philosophical Transactions of the

year 1753. "If any one," says he, "would have the visual angle of a telescope to contain 20 degrees, the extreme pencils of the field must be bent or refracted in an angle of 10 degrees; which, if it be performed by one eye-glass, will cause an aberration from the figure in proportion to the cube of that angle; but if two glasses are so proportioned and situated, as that the refraction may be equally divided between them, they will each of them produce a refraction equal to half the required angle; and, therefore, the aberration being in proportion to the cube of half the angle taken twice over, will be but a fourth part of that, which is in proportion to the cube of the whole angle; because twice the cube of one, is but one-fourth the cube of two; so the aberration from the figure, where two eye-glasses are rightly proportioned, is but a fourth of what must unavoidably be, where the whole is performed by a single eye-glass. By the same way of reasoning, when the refraction is divided between three glasses, the aberration will be found to be but the ninth part of what would be produced from a single glass; because three times the cube of one, is but one-ninth the cube of three. Whence it appears, that by increasing the number of eye-glasses, the indistinctness which is observed near the borders of the field of a telescope, may be very much diminished, though not entirely taken away."

We have given this quotation at full length to shew, that in his adoption of several glasses in an eye-piece, the ingenious mechanic was not entirely indebted to his experiments, unassisted by reasoning and mathematical inferences, and accordingly the Royal Society rewarded his skilful labours with Copley's medal. John Dollond was succeeded in his business by his no less ingenious and industrious son, Peter Dollond, who improved the achromatic object-glass still further, by placing a double concave flint-glass between two convex ones of crown-glass, as in *fig. 7*. and by enlarging the aperture to  $3\frac{1}{2}$  inches in a 45-inch telescope; of these, a great number has been manufactured, and several of five-foot focal length. His calculations of the radii of convexity and of concavity were never publicly made known; and perhaps constituted a secret, on which the continuance of his celebrity depended, when the time of his father's patent had expired. The business is now successfully conducted by G. Dollond, the nephew, to whom we are indebted for much liberal information; but at no period had any of the Dollonds an agent in Paris, as is said in the new Supplement to the Encyc. Britannica. For several years from the time of the eldest Dollond's death, the foreign Transactions were crowded with dissertations and memoirs on the combinations of achromatic lenses mathematically determined, and the subject afforded ample scope for the geometrical and analytical researches of an Euler, a Clairaut, and a D'Alembert, as well as for Boscovich, Klingenskierna, Kæstner, and Hénert: but in this, as in some other speculative investigations, the labours of the profound mathematician have not much benefited the practical advancement of the art to which these labours have been directed; nay, they have tended to keep at a distance from each other the mathematician and the mechanic.

Boscovich's eye-piece, however, may be considered as constituting an exception to the preceding remark, and deserves here to be particularly noticed. According to one of his theorems, an eye-piece free from colours may be composed of two similar lenses of the same glass, provided they be placed from each other just one-half of the sum of their focal distances; which is very similar to the eye-glass now commonly adopted, in preference to a single lens, in the common astronomical refracting telescope, the only difference

ference being, that in Boscovich's the lenses are of equal convexity; whereas, in the common improved astronomical eye-piece, the inner lens has a longer focus than the outer one, in the ratio of 3 : 1, and being both plano-convex, they both have their curved faces turned towards the object-glass.

From the preceding experiments of the Dollonds, have resulted all the advantages that the achromatic refracting telescopes possess over the long telescopes with simple object-glasses, and which have put them in competition with the best reflectors in the essential qualities of power, light, and distinctness of vision. There is, however, an imperfection, notwithstanding Dollond's great skill and perseverance, which remains yet to be overcome, if it is not invincible, which is, that while the colours occasioned by the extreme rays are corrected with sufficient accuracy by the compound object-glass, yet the intermediate rays are not perfectly corrected; and if any media can be so modified as to correct all the rays that fall on every point of the surface of the object-glass, so as to make them unite at the same point in the line of the axis; then, and not till then, will the object-glass be quite perfect. Peter, the son of John Dollond, who, we have said, succeeded to his father's business, pursued this subject after his father's death; and in the year 1765, communicated to the Royal Society by letter the result of his experiments. He remarks, that when his father had made object-glasses of one convex lens of crown-glass, and of one concave of flint-glass, to be used with convex eye-glasses, it was found that the excess of aberration was in the convex portion of the compound object-glass, and that the equality of the counteracting aberrations could not be carried to any great distance from the centre of the glasses; he therefore attempted, about the year 1758, to make short object-glasses of the same sort, to be used with concave eye-glasses; but it was found, that, as the field of view, in using a concave eye-glass, depended on the aperture of the object-glass, the limits of the aperture were too confined with a double object-glass. This trial led the senior Dollond to a conclusion, which the son took up, and profited by; namely, that the excess of spherical aberration, occasioned by one double convex lens of crown-glass, might be diminished by substituting two plano-convex lenses of similar glass and curves, placed one at each side of the double concave of flint-glass. The senior Dollond had succeeded with this construction when a concave eye-glass was used, and when the compound focus was short; but it remained for the son to complete a long object-glass of this construction, to be used with convex eye-glasses; which he succeeded in doing, first with a telescope of 5-feet focus, and  $3\frac{1}{2}$  inches aperture, and afterwards with a  $3\frac{1}{2}$ -feet one of the same aperture, which he invited the Royal Society to see, and which was the prototype of the numerous achromatic telescopes of the same dimensions, which have been since constructed and dispersed by sale through all the regions of the globe.

Among the first achromatic telescopes made by P. Dollond, was one purchased by the duc de Chaulnes, who examined very minutely the radii of the respective glasses, and published an account of them in French measures, which, converted into English inches, will stand thus; 32.4 and 40.8 for the outer convex of crown-glass; 22.2 and 30.6 for the double concave of flint; and 30.6 with 35.5 for the inner convex of crown-glass; but as the qualities of the respective glasses are not specified, no useful inference can be drawn for the construction of another telescope, in which the glass of each lens may be of another quality. This telescope, we learn from the present Mr.

G. Dollond, had a focal length of 46 inches: and the five-foot telescopes subsequently made, have each an aperture of four inches: but the largest and best telescope of the achromatic kind ever made by P. Dollond, is that of ten-foot focus, and five inches aperture, lately converted into a superb transit instrument by Mr. Troughton, and placed in Greenwich Observatory. See *TRANSIT Instrument*.

Soon after Peter Dollond's telescopes began to be in repute, namely, in the year 1759, Benjamin Martin, at the same time a mathematician and a mechanic, who had long turned his attention to the construction of telescopes, and described various constructions, published his "New Elements of Optics," a book now, like Edwards's Treatise, extremely scarce, in which he has entered more minutely into the doctrine of both kinds of aberrations, as they relate to practice, than any other author has done, either before or since. He not only followed the steps of J. Dollond in determining by glass wedges or prisms the relative refractive and dispersive powers of different specimens of glass, but ground single object-glasses of several kinds of glass, with tools of the same radius, and then compared the geometrical foci of each with the refracted or real foci, by nice measurements: by this means he ascertained the difference between the focus determined theoretically from the known radius, and the real or practical focus of the refracted rays in each glass by measurement, considering at the same time the distance of the radiant point: and thus he gained, as we shall have occasion to shew more particularly hereafter, the ratio between the sine of the angle of incidence and of the angle of refraction in each separate specimen, which ratio, in a ray passing from air into glass, had been assumed in all former optical theorems as 3 : 2 in all kinds of glass, and consequently the focus for parallel rays had been put equal to radius in double convex lenses, and also equal to the diameter in single convex, without regard to the quality of the glass, with respect to its refractive power. The rectification of the old theorem, founded on the constant ratio 3 : 2, formed the basis of the "New Elements of Optics," in which one half of the difference between the old theoretic and the refracted, or

practical foci was called  $a$ , and then  $\frac{R}{2a} = F$  with parallel

rays became the basis of the rectified theorems, which we propose to give presently in their proper place. According to these new elements, and from a measurement of the angles of dispersion, or of the coloured spectra contained between the extreme rays, as given by a prism of flint, and another of crown-glass respectively, the ratio of which he determined to be as 5 : 3, he calculated that "the radii of the lenses must have the same proportion as the differences of the sines of incidence and refraction in red and violet rays, in prisms of equal refracting angles of white and crown glass;" and that, therefore, "the radii [or foci] of the lenses must have the same proportion as the angles of dissipation in refractions by such prisms; and, of course, the same proportion as the lengths of the coloured spectra produced thereby." From these considerations the author concludes, that "in all cases of a compound lens for producing vision without colours, the ratio of the radii,  $r$  and  $R$ , of the concave and convex lenses (when two only are used) must be that of 5 : 3; and that then the ratio of their focal distances for parallel rays will be that of 3 : 2 nearly. The ratio of the foci of two lenses being thus determined that shall make the colours vanish, the longitudinal aberration arising from the respective curves was next considered; and in doing this, care was taken that the comparative foci of the two lenses was not to be altered by an alteration in the curves now to be rectified. By Huygens's

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gens's general theorem, the aberration arising from the curves of any lens may be determined and compared; and it being known from this theorem, that the longitudinal aberration is equal to  $\frac{1}{3}$ ds of the thickness of a double convex lens of equal radii, a double concave was determined from an equation of this aberration such, that its contrary aberration might counteract the aberration of the assumed convex lens of equal radii; and the numbers thus produced for the radii of the double convex of crown-glass, and of the double concave of flint respectively, were 8.36, 8.36, 10, and 23 inches, in which the focal distances of the two lenses are said to be nearly as 2 : 3. In this combination, the compound focus is stated to be 23.3 inches, and the radius  $r = 23$  is contiguous to the convex glass. Other calculations were also made where the radii of the convex lens were unequal, as well as those of the concave, but we do not learn that a good achromatic object-glass, put together agreeably to Martin's calculations, was ever yet constructed. In the instance before us, it is evident that the curve 8.36, coming in contact with the concave 23, must touch it in the middle, and therefore the proportions are impracticable.

While these various improvements in the construction of a telescope were going on, we must not omit to mention that different kinds of micrometers were applied to it successively, by different ingenious men, for the purpose of measuring small angles; by which addition, the science of astronomy has been greatly promoted. Among those promoters of this noble science, may be enumerated Auzout, Gascoigne, Hooke, Le Fevre, Kirchius, Cassini, Fouchey, Hollman, B. Martin, Savery, J. Dollond, Dr. Maskelyne, Ramsden, Dr. Herschel, Smeaton, Rochon, Kästner, Cavallo, Troughton, and Arago, the present astronomer royal of France.

But it remained for the ingenious optician of Hflington, C. Tulley, to whom we are indebted for much valuable information on the subject of our present inquiries, to calculate and manufacture, from any two given specimens of crown and flint glass, a double object-glass that shall, generally speaking, be found both achromatic, and also as free from the effects of spherical aberration as art can make it.

After this artist had made himself master of Martin's proposed plan of compounding an achromatic object-glass, he found that the curves calculated for this purpose would not produce their desired effect with any specimens of glass that could be procured; but still he thought that a careful repetition of Martin's experiments might lead to results favourable to his views, when some modification was made in their application. He therefore, in the year 1800, obtained six sorts of glass, differing in specific gravity, and ground them all to the same radius by a tool of speculum metal, that did not much alter its figure by attrition in grinding, and in giving a partial polish: these lenses were fitted successively to one cell, that was received by a tube having an eye-piece at the opposite end, in order that the solar focus of the refracted rays might be the more accurately measured with each glass used as an object-glass of a telescope; and though the polish was imperfect in these lenses, ground and partially polished by the same tool, yet the image of the sun was clearly defined by them. These focal distances, limited by the solar image, were in the next place measured carefully by a nicely divided scale, and were found to differ from one another considerably, as we shall hereafter have occasion to state more particularly: the radius of curvature of the tool was also ascertained with equal care, and found to exceed in length the longest of the focal lengths of the refracted rays. The radius of the tool was then divided by each of the refracted focal lengths, and the quotients were called so many divisors or multipliers, accordingly as the geometrical was

to be determined from the refracted focus, or the contrary. These quotients, therefore, bore the same proportion to unity, that the geometrical focus bore to the refracted focus of each lens, and turned out to be very nearly the same quantities that Martin had determined with glasses of similar qualities, and that he denoted by the expression  $2a$  in his revised theorems. In fact, they were the numbers from which the ratio of the sines of the angles of incidence to the sines of the angles of refraction were accurately determined, as will be explained hereafter. The specific gravities of the different lenses were then taken with a good hydrostatic balance, and were found to increase with their corresponding divisors, but not in a regular proportion. From these experiments a set of tables was constructed, containing in parallel columns, both for crown and flint glass, the specific gravities, varying from 3.466 to 2.428, together with the corresponding ratios of the sines of the angles of incidence and of refraction; and also the ratios of the two curves, that shall produce an assigned longitudinal spherical aberration in any lens; all which calculations are extended from the ratios 1 : 1, 1 : 1.01, 1 : 1.02, &c. in succession, up to 1 : 6, where the aberration is a minimum, as was long ago determined by Huygens: and what is worthy of remark, the French plate-glass, which had the specific gravity lowest, and its divisor only 1.004, and which, consequently, had its refracted focus nearly equal to its geometrical focus, was, in all probability, similar to the glass manufactured at the time when the experiments of sir Isaac Newton were made, from which the original optical theorems were framed. From these tables, our skilful optician takes his curves by inspection suitable for glass of any given specific gravity, such as will suit his tools for telescopes of different lengths; and having as it were the command of the whole range of varying ratios, he can immediately fix on suitable curves for any glass, and for any compound focal length, or even assign a fellow that shall match any practicable lens, convex or concave, that has been previously polished. Such is the facility which this ingenious and persevering optician has attained in the highest branch of his art, whilst, at the same time, his skill in grinding, polishing, and centering his glasses, is not exceeded by any other artist. The principal deviation from Martin's rules, that Tulley found it necessary to adopt in his practice, is the application of a *correcting number* to the calculated or tabulated aberration arising from the figure of the flint-glass, on account of its difference of refractive power, as compared with that of the crown-glass: in order to gain which correcting number in all different cases, he first reduces the geometrical foci of the two separate lenses into the refracted foci by his divisor = Martin's  $2a$ , and extracts the square root of the cubes of those refracted foci respectively; then dividing the root of the flint-glass by the root of the crown-glass, he gains the *correcting divisor*, by which the calculated aberration of the flint-glass is divided, to produce the *corrected aberration* for the concave lens; which lens must now have its radii determined agreeably to this corrected aberration from the general theorem, or may be taken from the tables to be substituted for the radii that would have been requisite, if the proportional aberration had remained uncorrected. And lastly, that the foci of the separate lenses may be so proportioned to each other, and to the compound focus of both the lenses, which is usually given when a telescope is to be made, the ratio between the focus of the crown-glass and of the compound glass, having been calculated by an appropriate theorem, as will be explained, is tabulated to suit different sorts of glass agreeably to their specific gravities; so that Martin's constant ratio of 5 : 3 is varied according to the variation of the specific

cific gravity, which is assumed as bearing a due proportion to the dispersive power. Thus, when a piece of crown and a piece of flint glass are produced for an achromatic object-glass, the specific gravity is first taken, and then the tabulated numbers, corresponding to these gravities, are taken from the columns of the tables, and the work is put in hand as soon as suitable tools are selected for producing the curves: or rather, when the relative foci are determined, the curves are fixed on in the tables that will suit the aberrations in question, and that can also be produced by such tools as are in use; for the formation of a new grinding tool is a serious undertaking, that the optician will wish to avoid. But after all, the chief practical difficulty remains; the same curves cannot always be worked to be exactly similar, even in the same glass, with the same tools, and by the best workmen; which circumstance leaves the nice calculator, in some measure, under the controul of his materials, and renders final adjustments indispensable. These observations are corroborated both by the candid acknowledgment of Tulley, and by the subjoined extracts, which we beg leave to transcribe from the letters of our estimable correspondent Mr. G. Dollond.

"The perfection of our object-glasses," says Mr. Dollond, "is in a great degree promoted by the great pains we take in selecting those glasses that suit each other the best; and also in adjusting them very carefully: yet that is not every thing that is necessary to produce good object-glasses; they must be correctly worked, and the glasses be of perfect and proper quality.

"With respect to the surfaces used in our various object-glasses, it would be almost endless to enumerate them, as they depend upon, and vary with almost every piece of glass that is used in their formation; and there are some nice points in the method of working them, which I should not wish at present to disclose. Our usual mode of proceeding is, in the first place, to calculate the proportions that are requisite for the kinds of glass that are to be used, and then to select from our great number of tools those that come the nearest to the surfaces determined upon; and it frequently happens that we have not any that will answer, particularly for the spherical aberration. We do not enter into those very nice calculations that would be satisfactory to a theorist; we only aim at something near to what is required; for to practical men, it is always more easy to produce what they wish by practical methods. Mr. Short, the celebrated maker of reflecting telescopes, used to proceed by first making his large metal as nearly correct or parabolical as he could, and then, from a number of small metals, to select, by trial, that which corrected the large one in the best manner.

"In all matters relating to the practice of optics there is much uncertainty, and it frequently happens that, with the very best endeavours, we cannot produce by the same means the same effect, where extreme correctness is required; so that you may very readily conceive, that very exact calculations, however requisite, will not always answer. In a rough way of taking the focal lengths and surfaces of an achromatic object-glass, composed of crown and flint glass of the usual densities, we should say crown 1 : 3 and flint 2 : 3; the outer surface of the crown shorter than that which is next to the flint, and the shortest radius of the flint next to the crown; and the nearer it can be brought without touching in the middle, the more perfect will be the performance; though this will in a great degree depend on the aberrating powers of the glasses used; for sometimes we find it necessary to make the crown nearly of equal radii. The French opticians make the radii of the convex lens very unequal, and place the shortest radius next to the flint; and instead of crown they use Bohemian plate, which is nearly of the same

refracting power, but of a different colour, their flint-glass being of a much less specific gravity than the English.

"The great barrier to further improvement, particularly in the extension of the aperture, is the want of good glass, which circumstance has ever been lamented; and from the excessively increased duties, which act against the improvement of every manufacture, a prohibition is now likely to take place altogether."

In this historical account of the invention and successive improvements of the telescope, we have said nothing about the ingenious experiments of Dr. R. Blair, professor of astronomy in the university of Edinburgh, which were made, with a view to ascertain the dispersive powers of different liquids, about the year 1787, and for this reason, that we consider any telescope of which a liquid forms a constituent part, to be a temporary rather than a permanent instrument. Neither have we given Dr. Herschel's labours so prominent a place in our narrative as they deserve, because we shall have occasion to describe his reflecting telescope, with reference to its appropriate plate, in a subsequent section of our article.

Besides the preceding improvers of the telescope, several persons, chiefly amateurs, have taken out patents, either for alterations in the appendages of this instrument, or for peculiar modes of using them for particular purposes, with a short notice of which we shall conclude this section of our article. On the 4th of April, 1791, Mr. Robert Blair, a surgeon in the navy, took out a patent for securing to himself the advantages to be derived from using a fluid medium, in conjunction with glass, to correct the prismatic aberration in an object-glass of a refracting telescope, agreeably to the experiments previously made on this subject by Dr. Robert Blair, as we have just stated. On the 26th of January, in the year 1799, Mr. Cater Rand, of Lewes in Sussex, took out a patent for "an improved military and naval telescope, for ascertaining distances, and the size and extension of objects, at sight, by means of a new micrometrical adjustment." This micrometrical telescope, however, was nothing more than the parallel wire micrometer, applied to a common pocket achromatic telescope, in which a vernier scale projected from the eye-piece, and indicated the quantity of the measured angle to the professed accuracy of 6"; but how the instrument was kept steady enough without a stand for the use of such a micrometer, is not explained. Mr. Dudley Adams, of Fleet-street, optician, took out a patent, on May 30, 1800, for rendering telescopes more portable; the object of which was to secure the advantage to be derived from using tubes, with slits made in such a way as to make them move smoothly, and yet without shake, within one another. Mr. G. H. Brown, secretary to the Westminster fire-office, in Bedford-street, Covent-Garden, has described, in the 11th volume of the Repertory of Arts and Manufactures, a reflecting telescope, that always lies in a horizontal position; and, receiving the rays of light on an inclined plain mirror, having a central perforation, and placed near the insertion of the eye-tube, reflects them to the large concave speculum, which, by a second reflection, forms the image in the eye-tube. Benjamin Martin constructed a reflecting telescope in this way, which he used in a vertical position for terrestrial objects; and the only difference in the two constructions seems to be, that in Martin's, the main tube was reclined when viewing elevated objects, such as the heavenly bodies, whereas Brown's plain mirror has a vertical motion independently of the main tube. They have neither of them come into common use.

Mr. Manton, gun-smith, of Davis-street, Berkley-square, London, took out a patent on the 23d of January, 1810,  
for

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for securing the use of an exhausted tube, on a supposition that there would be more light when the rays were refracted to a focus *in vacuo*. Mr. Cornelius Varley, artist, now of Newman-street, London, took out a patent for a graphic telescope, for the purpose of delineating drawings from nature, on the principle of Dr. Wollaston's camera lucida, the date of which is April 5, 1811. And on the 21st of May of the same year, Dr. Brewster of Edinburgh, and Mr. Harris, optician, of Holborn, London, jointly took out a patent for a micrometrical, double-image, and coming-up glass, &c. which has its scale of measurement running longitudinally along the tube. This telescope, being on a new construction, will be particularly described hereafter.

2. *Theory of dioptric Telescopes.*—Before we can properly describe the various constructions of either the refracting or reflecting telescope, it will be necessary to explain the principles on which those constructions are founded; and for the sake of order, we will confine ourselves, in the first place, to the consideration of the elementary principles of dioptrics, so far as they are connected with the theory of the refracting telescope. Among the various writers who have considered this subject, in both a scientific and practical manner, Benjamin Martin stands first in our estimation; and as his "New Elements of Optics," published in 1759, are but little known, by reason of the scarceness of this work, notwithstanding it contains the result of all his theoretical and practical investigations, we shall make no scruple in availing ourselves of his labours, as often as they contribute to the purpose of either illustration or practical application: our aim being, in this article, as in some former ones connected with it, to bring the mathematician and the mechanic into a state of mutual understanding.

We propose, therefore, to avoid as much as possible all abstruse calculations, that have no tendency to produce practical advantages, but to introduce, in as familiar a manner as possible, those mathematical investigations only, which are essentially explanatory. The first and fundamental principle in dioptrics is this, that in all uniform media, such as air, water, glass, &c. "the sines of incidence are in a constant ratio to the sines of refraction" of any homogeneous ray of light, incident on the surface of such refracting medium; which principle was first discovered by Snell, when Huygens had gone no further than to assert, that in small obliquities of incidence, the angle of refraction was about one-third of the angle of incidence. In the glass which Sir Isaac Newton used, the ratio of the sine of incidence to the sine of refraction was found to be 30 : 21, or nearly 3 : 2, in passing out of air into glass: and had all kinds of glass been found equal with respect to their refractive powers, the radius of convexity would, in all cases, have been equal to the focus of a double convex lens of equal radii; which equality may be considered as the basis of all the *geometrical* theorems in optics, that take no account of the difference of the *refractive powers*. But since the difference of the refractive powers of various specimens of glass has become an object of indispensable examination to the optician of modern times, it has become necessary to introduce into each theorem the ratio between the sine of incidence and sine of refraction, whatever it may be found to be by experiment, before the *refracted* focus of any individual lens, depending on the quality of the glass, in some measure, can be determined from the *geometrical* focus depending on the radius of convexity or concavity. As we have demonstrated, under our article REFRACTION, the constancy of the ratio between the sines of the angles of incidence and of refraction of a mean refracted ray; and have also explained how the *geometrical* focus of any lens may be deter-

mined with converging, parallel, and diverging rays, under the term LENS; we will proceed to apply the doctrine arising out of these demonstrations and explanations to our present purpose. "Let DC (*Plate XXIV. Astronomical Instruments, fig. 1.*) be a ray of light incident out of any medium X, upon the surface, HO, of another medium Y, which we will suppose to be more dense than X; and from the point of incidence C, let it be refracted to F, out of its first direction DCM. This refraction may be considered as arising out of the attracting power at the surface of the medium Y, and as acting upon the ray in a perpendicular direction, by which, on mechanical principles, it will acquire some additional force and velocity of motion through the medium Y. Now upon the centre C describe the circle AOPH, cutting the incident ray in D; and drawing the diameter ACP perpendicular to HO, let DL fall perpendicular thereto, and it will be the *sine of incidence*. Let DC or CE represent the space described in a given time in the medium X; and from E draw EF parallel to AB, to denote the acquired force in C: then the motions in the directions CE and EF, in the same time, being compounded, will produce a motion in the direction found by joining CF; for CF will be the space described in the medium Y, in the same time that DC (= CE) was passed over in the medium X, and consequently will be the *refracted ray*; and GI, perpendicular to AB, will be the *sine of refraction*.

"Through F draw NM parallel to HO, and draw KE perpendicular to AB; then will BF = KE = DL be the *sine of incidence*; and in the similar triangles CIG, CBF, we have CG : CF :: GI : BF. Hence it appears that we have the sines of the angles of incidence and of refraction BF or DL, and GI, as the velocities CF and CD (= CG) in the different media inversely, and on this supposition they are in a *constant ratio*; because the velocities are invariable, being produced by the uniform operation of nature. And on the contrary, if the ray FC be considered as passing out of a dense medium Y, into a rare medium X, it will be deflected by the superior force of the medium Y, into the direction CD; making DL : IG :: CF : CD, as before.

"Let us now conceive AMD, in *fig. 2.* to be the curved surface of a refracting medium Y, and B a radiant point in a more rare medium X, from which two rays proceed, and fall upon the curve in the points M and N indefinitely near to each other: these rays will be so refracted as to cross each other in a certain point F; to determine which from the given equation of the curve, the distance of the radiant, and the refractions of the media, is that problem in dioptrics, on which the various calculations and inferences depend. That we may render the solution of this problem intelligible to our readers, let us make the lines CM and CN the radii of curvature, and consequently perpendicular to the curve at the points M and N; upon MF and NF let fall the perpendiculars CG and Cg, cutting FM in S: also upon the incident rays BM, BN, continued, let fall the perpendiculars CE, C<sub>e</sub>; and on the centres B and F, describe the small arcs RM, MO; and put BM = *d*, ME = *a*, MG = *b*; the arc MR = *s*, and the arc MO = *t*; and lastly, the sine of incidence CE to that of refraction CG, as *m* to *n*, the radius of curvature being CM = *r*. Then the triangles MEC, MRN; MGC, MON; MBR, QBe, are similar, as is thus evident: if from the right angles RME, CMN, you subtract the angle EMN, there remains the angle RMN = EMC; and if from the right angles FMO, CMN, you take the angle FMN, there will remain the angle OMN = GMC. These tri-

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angles are, therefore, *equiangular*, and consequently *similar*. Hence we derive the following analogies for determining the refracted ray MF; viz. ME : MC :: MR : MN;

that is,  $a : r :: s : \frac{rs}{a} = MN$ .

“ Again, from the triangles MGC and MON, we have MG : MC :: MO : MN; that is,  $b : r :: t : \frac{rt}{b} =$

$\frac{rs}{a}$  ∴  $sb = at$ ; and so  $a : b :: s : t$ , or  $\frac{bs}{a} = MO$ .

And in the triangles BMR, BQe, we have BM : Be (= BE) :: MR : Qe; that is,  $d : d + a :: s :$

$\frac{ds + as}{d} = Qe$ . But Ce : Cg (:: CE : CG) ::

$m : n :: Ce - CE : Cg - CG :: Qe : Sg ::$

$\frac{ds + as}{d} : \frac{nas + nds}{md} = Sg$ .

“ Lastly, the similar triangles EMO, FSg, give MO : Sg :: MF : SF or GF; therefore, MO - Sg :

MO :: MF - GF (or MG) : MF; that is, in symbols  $\frac{bmds - aans - ands}{amd} : \frac{ts}{a} :: b : \frac{mddb}{mdb - aan - nda}$  = MF, the focal distance required.

“ As the right angles at E and G are both subtended by the same hypothenuse, or right line MC, it is evident that this line is the diameter of a semicircle, MEGC, passing through them, as in *fig. 3*; and if the curve AMD be a circle, then C will be its centre: and when the point M is extremely near to the vertex A, there will be ME = MG = MC, or  $a = b = r$ . In this case, the theorem becomes  $\frac{rmd}{md - nd - nr} = AF = f$ ; and the point F, or focus of refracted rays, is then in the axis BC produced.”

From this original theorem for finding the simple refraction of a pencil of diverging rays out of a rare into a dense medium, may be derived other theorems for finding the simple refraction out of a dense into a rare medium, and for the refraction of lenses of any of the common shapes, either at the first or second surface. We will subjoin a small table of such of those theorems as apply to glasses of the ordinary construction.

## Theorems for one simple Refraction.

Out of Air into Glass		
Rays.	Convex.	Concave.
Diverging	$\frac{m dr}{m d - n d - n r} = f.$	$\frac{- m dr}{m d - n d + n r} = f.$
Parallel	$\frac{m r}{m - n} = f.$	$\frac{- m r}{m - n} = f.$
Converging	$\frac{m dr}{m d - n d + n r} = f.$	$\frac{- m dr}{m d - n d - n r} = f.$
Out of Glass into Air.		
Diverging	$\frac{- n dr}{m d - n d + m r} = f.$	$\frac{n dr}{m d - n d - m r} = f.$
Parallel	$\frac{- n r}{m - n} = f.$	$\frac{n r}{m - n} = f.$
Converging	$\frac{- n dr}{m d - n d - m r} = f.$	$\frac{n dr}{m d - n d + m r} = f.$

Hitherto we have considered the refraction of a ray at only one surface of a lens; but as every lens has two surfaces, or radii,  $r$  and  $R$ , it is necessary to carry our investigation farther, and see what theorems can be obtained for finding the foci of glasses of the different shapes, when double refraction takes place, which is the case in all instances of complete transmission. By way of distinction, we will consider  $r$  as the radius of the first surface, or that which receives the rays from the radiant; and  $R$  as the second surface, or that which is supposed to be turned from the radiant, in all our subsequent theorems. We must now

consider a ray, as MN, in *fig. 4*, coming out of a dense medium Y, after proceeding in a direction towards F, into the rare medium X; but meeting with a spherical surface ND, on quitting the dense medium, is refracted into the direction Nf, to intersect the axis Df, in the focal point f. When two spherical refracting surfaces are near to each other, as AM, ND, in *fig. 5*, they constitute a lens AMND, of which the radius of the curve AM is  $r$ , when the radiant is on that side, but that of ND is denominated  $R$ ; and the line BADF, passing at right angles through the middle of the lens, is called the axis. Now to find

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find the point  $f$ , or focal distance  $Df$ , of the ray  $BM$ , coming from the radiant  $B$ , after being twice refracted, *viz.* at  $M$  and  $N$ , the points of ingress and egress, is the *general problem of dioptrics*.

In solving this problem, our original theorem for simple refraction gives us  $mdf - mdr = nrf + ndf$ , (making  $MF = \phi$ ), from which equation we deduce this expression; *viz.*

$$\frac{m}{n} = \frac{r+d}{\phi-r} \times \frac{\phi}{d} = \frac{BC}{CF} \times \frac{AF}{AB},$$

which gives this universal canon: *viz.* "the ratio of the sine of incidence to the sine of refraction, is compounded of the ratio of the distances of the conjugate foci  $B$  and  $F$  from the centre  $C$ , and of the ratio of their distances from the vertex  $A$ ." This rule being *general*, finds the focus  $f$ , after the second refraction at  $N$ : for let  $Df = f$ , the radius  $GD = R$ , and the thickness of the lens  $AD = t$ ; then we have for the refraction

out of a dense medium into a more rare one,  $\frac{n}{m} = \frac{FG}{fG}$

$$\times \frac{fD}{FD} = \frac{\phi + R - t}{1 + R} \times \frac{f}{\phi - t};$$

from whence we get

$$f = \frac{n\phi R - ntR}{m\phi - mt + mR - n\phi + nt} = Df,$$

the focal distance required. If we omit the thickness of the lens  $t$ , as being inconsiderable, we may reduce the equation into a more

simple form; for we shall have  $\frac{n\phi}{m\phi + mR - n\phi} = f$ ; and

this will give  $\phi = \frac{mfR}{nR + nf - mf} = \frac{mdr}{nd - nd - nr}$ ,

which equation reduced gives

$$\frac{ndrR}{mrd - nrd + mdr - ndr - nrR} = f.$$

But to reduce the number of symbols, let us put  $\frac{m-n}{n} = a$ , and consequently  $m-n = a$ , when  $n$  is unity,

and then this equation becomes  $\frac{drR}{ard + aRd - rR} = f$ ,

and this may with propriety be called the *universal dioptric theorem*, by which the *refracted focus* of a ray may be determined after passing through any lens of a given density, or refracting power.

The theorems in the subjoined Table I. are all derived from the universal theorem thus determined, and will be of great use to the optician to determine the *refracted focus* of any lens, and for any distance of the radiant, which refracted focus, with parallel rays, will be always equal to

the true, or nicely measured *solar focus*, where  $d$  is infinite; whereas the focus determined from the old theorems in Table II. where the value of  $a$  is omitted, is always the *geometrical focus*, determined on a supposition that the sine of incidence is to the sine of refraction in all glasses as 3:2,

in which case  $\frac{m-n}{n}$ , i. e.  $\frac{3-2}{2} = \frac{1}{2}$  invariably, and  $\frac{1}{2}r$ ,

in a double convex lens of equal radii, of whatever refractive power, =  $f$ . In order, therefore, to distinguish the focus determined from the theorems in Table I., from those arising from the theorems in Table II., we will always call the first the *refracted focus*; which is that from which the *powers* of a telescope or of a microscope are derived; and the second we will denominate the *geometrical focus*, which is that arising from the simple consideration of the radii of curvature, without reference to the refractive power of the glass, otherwise than as we have stated; but is notwithstanding useful to opticians in the formation of the curved faces of their grinding and polishing tools; for when the curves of a lens of a given refractive power are to be formed, to produce a given refracted focus, as is frequently required in the nicer optical instruments, the refracted focus must first be converted, by means of the value  $a$  of its refractive power, into the *geometrical focus*, and then the radii of curvature belonging to this calculated geometrical focus, will be proper for the tools of the lens of a given refractive focus. Hence we consider it as a matter of great practical importance, to give, in the same place, two tables, one for finding the *refracted*, and the other for finding the *geometrical foci* of such lenses as are usually applied in either a telescope or microscope of the refracting construction. In all cases where the glass has two radii, the first, as we have said, will be denominated by  $r$ , and the second by  $R$ .

But before we proceed to tabulate our theorems for both *refracted* and *geometrical foci* of single lenses, we wish it to be clearly understood by our readers, that the practical application of those theorems, and of others to be derived from them, to the purpose of actual construction of achromatic object-glasses, and of achromatic eye-pieces, is intended to be the leading feature of our article; for while volumes have been filled with abstruse calculations, derived from formulæ of the most celebrated mathematicians, the results of those calculations have never produced proper data for the use of opticians; more particularly with respect to achromatic object-glasses, which cannot be constructed from any calculations but what are grounded upon experimental examination of the identical specimens of glass that are intended to be used. And we flatter ourselves, that the information we have to lay before our readers on this interesting subject, will be the *first* that has yet been *published* in such a *practical form* as will facilitate the labours of the working optician.

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TABLE I.—Theorems for finding the *refracted* Foci of Lenses.

Lenses with unequal Radii.		
Rays.	Convex.	Concave.
Diverging	$\frac{d R r}{a d r + a d R - r R} = f.$	$\frac{d R r}{-a d r - a d R - r R} = f.$
Parallel	$\frac{r R}{a r + a R} = f.$	$\frac{r R}{-a r - a R} = f.$
Converging	$\frac{-d r R}{-a d r - a d R - r R} = f.$	$\frac{-d r R}{a d r + a d R - r R} = f.$
Lenses with equal Radii.		
Diverging	$\frac{d r}{2 a d - r} = f.$	$\frac{-d r}{2 a d + r} = f.$
Parallel	$\frac{r}{2 a} = f.$	$\frac{-r}{2 a} = f.$
Converging	$\frac{-d r}{-2 a d - r} = f.$	$\frac{d r}{-2 a d + r} = f.$
Lenses with one Radius (R) infinite.		
	Plano-convex.	Plano-concave.
Diverging	$\frac{d r}{a d - r} = f.$	$\frac{-d r}{a d + r} = f.$
Parallel	$\frac{r}{a} = f.$	$\frac{-r}{a} = f.$
Converging	$\frac{-d r}{-a d - r} = f.$	$\frac{-d r}{a d - r} = f.$
Lenses with one Radius (R) negative, or Menisci.		
	Unequal.	Equal.
Diverging	$\frac{-d r R}{a d r - a d R + r R} = f.$	$-d = f.$
Parallel	$\frac{-r R}{a r - a R} = f.$	$\frac{-r R}{o} = f.$
Converging	$\frac{d r R}{a d R - a d r + r R} = f.$	$d = f.$
Lenses with both Radii (r and R) negative, or double concave.		
Diverging	$\frac{d r R}{-a d r - a d R - r R} = f, \text{ always negative.}$	
Parallel	$\frac{r R}{-a r - a R} = f, \text{ always negative.}$	
Converging	$\frac{-d r R}{a d r + a d R - r R} = f.$	

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TABLE II.—Theorems for finding the *geometrical* Foci of Lenses.

Lenses with unequal Radii.		
Rays.	Convex.	Concave.
Diverging	$\frac{2 d R r}{d R + d r - 2 r R} = f.$	$\frac{2 d R r}{-d R - d r - 2 R r} = f.$
Parallel	$\frac{2 r R}{R + r} = f.$	$\frac{2 R r}{-R - r} = f.$
Converging	$\frac{2 d R r}{d R + d r + 2 R r} = f.$	$\frac{2 d R r}{d R - d r - 2 R r} = f.$
Lenses with equal Radii.		
Diverging	$\frac{d r}{d - r} = f.$	$\frac{d r}{-d - r} = f.$
Parallel	$\frac{d r}{d} = r = f.$	$\frac{d r}{-d} = f.$
Converging	$\frac{d r}{d + r} = f.$	$\frac{-d r}{d - r} = f.$
Lenses with one Radius (R) infinite.		
Diverging	$\frac{2 d r}{d - 2 r} = f.$	$\frac{-2 d r}{d + 2 r} = f.$
Parallel	$\frac{2 d r}{d} = f.$	$\frac{-2 d r}{d} = f.$
Converging	$\frac{2 d r}{d + 2 r} = f.$	$\frac{2 d r}{2 r - d} = f.$
Lenses with one Radius (R) negative.		
	Unequal.	Equal.
Diverging	$\frac{-2 d R r}{d R - d r + 2 R r} = f.$	$\frac{-2 d R r}{2 R r} = -d = f.$
Parallel	$\frac{-2 R r}{R - r} = f.$	$\frac{-2 R r}{0} = f.$
Converging	$\frac{2 d R r}{d R - d r + 2 R r} = f.$	$\frac{2 d r R}{2 r R} = d = f.$
Lenses with both Radii (r and R) negative, or double concave.		
Diverging	$\frac{2 d R r}{-d R - d r - 2 R r} = f.$	$\frac{d R}{-d - R} = f.$
Parallel	$\frac{2 R r}{-R - r} = f.$	$\frac{d R}{-d} = f.$
Converging	$\frac{-2 d R r}{d R + d r - 2 R r} = f.$	$\frac{-d R}{d - R} = f.$

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As we explained how Table I. is derived from an universal dioptric theorem, we shall explain how the theorems in Table II. are deduced from one fundamental equation, on a supposition that the sines of incidence and refraction in glass are always as 3 : 2. Let LN, in *fig. 6*, represent a convex lens, O*f* its axis, O a radiant point therein, OA a ray proceeding from thence to A, a point in the surface LBN; then if C is the centre of convexity of that surface, CG, drawn through the point A, will be perpendicular to that surface in the point A; CA or CB is the radius, Af the refracted ray, and *f* the point where it meets the axis after the first refraction. Let DB = *d*, CA = R, EB = *t*, the thickness of the lens; and let the sine of the angle of incidence OAG be called *m*, and the sine of the angle of refraction CA*f* or GAH be called *n*. Now, since the point A is supposed to be very near to the vertex B, OA may be considered equal to OB = D, and in the triangle CAO, we shall have AO to AC as the angle C to the angle O; that is, *d* : R :: C : O. Also OB + BC = D + R will be as the opposite angle CAO or OAG, the sines of both being the same. Then as *m* : *n* :: *d* + *r* :

$\frac{Dn + Rn}{m}$ , which will be as the angle CA*f*; this, taken from the angle ACO = *d*, leaves the angle AfO =  $\frac{Dm - Rn - Dn}{m}$ . Lastly, as the angle *f* : O :: AO or OB : Af or B*f*; that is, as  $\frac{Dm - Rn - Dn}{m}$  : R :: D :  $\frac{RDm}{Dm - Rn - Dn}$  = B*f*, the distance of the point *f*

in the axis, after the first refraction. But since there is a second refraction of the ray AO to some other point in the axis, as F, in *fig. 7*. In this case, the refraction being out of a dense into a rare medium, the sine of incidence will be to that of refraction the *reverse* of what it was before, *viz.* as *n* to *m*; that is, the sine of Ia*f* is to the sine of IaF as *n* to *m*, which, in the case of single refraction, was as *m* to *n*. Here let Ka be called *r*, and Ef = *d*; then there will be *d* : *r* :: K : *f*, and Ef + EK = *d* + *r*, which will be as the angle *f*aK, or its complement Ia*f*;

therefore *n* : *m* :: *d* + *r* :  $\frac{dm + rm}{n}$ , which will express the angle IaF. Then IaF - aKF =  $\frac{dm + rm}{n} - d = \frac{dm - rm - dn}{n}$  = aKF. Now, as F : K :: Ka or

KB : aF or EF; that is, as  $\frac{dm + rm - dn}{n}$  : *d* :: *r* :  $\frac{ndr}{dm + rm - dn}$  = EF. But B*f* - BE =  $\frac{DRm}{Dm - Rn - Dn} - t = d = Ef$ ; therefore, putting *m* - *n* = *b*, we shall have  $d = \frac{DRm}{Db - Rn} - t = \frac{DRm - Dbt + rnt}{Db - Rn}$ .

Also  $dnr = \frac{DRmnr - Dbtnr + rtnnr}{Db - Rn}$ .

Again,  $dm + rm - dn = Db + rm$ ; if, therefore,

we multiply the equation by *b*, and add thereto *rm*, we shall have  $dm + rm - dn$

$$= \frac{DRnb - Dbtb + Rntb + Dbrm - Rnmr}{Db - Rn}$$

Then  $\frac{dnr}{dm + rm - dn}$

$$= \frac{DRmnr - Dbtnr + Rtnnr}{DRnb - Dbtb + Rntb + Dbrm - Rnmr} = EF.$$

This last equation may be abridged, by substituting *p* for  $\frac{n}{b}$ , that is, for  $\frac{n}{m-n}$ , then we shall have

$$\frac{pDRmr - pDbtr + Rtnrp}{DRm - Dbt + Rnt + Drn - pRmr} = EF.$$

Lastly, if we take *n* = *pb* in *pDbtr*; and *m* - *n* = *b* in *Dbt*; this equation will be finally reduced to this fundamental equation, *viz.*

$$\frac{pDRrm - Dtrn + Rtrpn}{DRm - Dtm + Dtn + Rtn + Drm - pRrm} = EF = f.$$

The ratio of *m* to *n* being taken in glass as 3 : 2, we shall have  $\frac{n}{m-n} = \frac{2}{3-2} = 2 = p$  for a glass lens, and the equation will then stand thus; *viz.*

$$\frac{6DRr - 2Dtr + 4tRr}{3DR - 3Dr - Dt + 2Rt - 6Rr} = EF = f;$$

and when *t*, the thickness, is disregarded, we have from this fundamental theorem all the various theorems contained in Table II. for finding the geometrical focus under all the various circumstances that are likely to occur in the position of a single lens, where the refractive power is not adverted to.

To illustrate the respective uses of the theorems contained in the two preceding tables, we must suppose the ratio between the sines of the angle of incidence and of refraction known by some of the usual modes of determining it experimentally; and then, when the ratio of *m* : *n* is found

determined, there will be  $\frac{m-n}{n} = a$ , the symbol introduced in the theorems of the first table; when *d* is equal to the distance of the radiant, *r* the radius, and *f* the proper focus determined by real refraction through the glass used,

the theorem for finding the value of *a* is  $\frac{dr - rf}{2df} = a$ .

For instance, Martin ground a piece of white flint-glass with a tool of 21.5 inches radius, into a double convex lens, and when a lamp was placed at the distance of 417.25 inches, the refracted focus was measured accurately, and found to be only 18.75 inches; whence, according to the theorem,

we have  $\frac{417.25 \times 21.5 + 21.5 \times 18.75}{2 \times 417.25 \times 18.75} = 0.599 = a = \frac{m-n}{n}$ ; and if we put *n* = 1, then *m* will be 1.599, for

$\frac{1.599 - 1}{1} = 0.599$ . When the sun is the radiant, then *d* becomes infinite, and the theorem becomes, as in the first

table,  $\frac{r}{2a}$ , which gives, in this case,  $\frac{21.5}{1.198} = 17.94$  for the refracted

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refracted solar focus; whereas, by Table II., the geometrical focus is  $\frac{dr}{a} = r = 21.5$ . If the refractive power

of the glass, and consequently the value of  $a$ , had been given, and it had been required to determine the radius of the tool that will grind the given glass into such equal radii as will give the refracted solar focus exactly 17.82 inches, then

the theorem  $\frac{r}{2a} = f$  becomes, by transposition,  $2af = r$ , and  $1.298 \times 17.94 = 21.5$ , as before. In a specimen of crown-glass ground to the same radius, where  $d$  was 414.75 inches,  $\frac{dr + rf}{2df}$  gave  $a = 0.5318$ , and consequently  $m : n$

as 1.5318 : 1, with which lens the true solar focus was  $\frac{21.5}{1.0636} = 20.214$ ; and if the lens had been a single convex,

the true solar focus would have been  $\frac{r}{a} = \frac{21.5}{.5318} = 40.428$ ,

or double the length of the former, while the geometrical focus for parallel rays, by Table II., would have been

$\frac{2dr}{d} = 2r = 43.0$ ; so that for many practical purposes,

where  $m - n$  is known in the particular glass used, the advantage of the theorems in Table I., over those in Table II., must be evident

Again, let us suppose that the ratio of  $m : n$  is ascertained by a prism of any specimen of glass, or by Dr. Wollaston's or Dr. Brewster's instruments for this purpose, and that it is known to be 1.599 : 1; then we know that  $.599 = a$ , as before; and let it be required to find the refracted focus with diverging rays, when the radiant is as before at the distance of 417.25 inches, and the radius of curvature of each surface 21.5: in this case the theorem is

$\frac{dr}{2ad - r} = f$ , or, in numbers,  $\frac{417.25 \times 21.5}{2 \times 0.599 \times 417.25 - 21.5}$

$= 18.75$ , as before; and in this way the terms given may be varied at pleasure, and the theorem made applicable to the case in question. If the rays had been converging in

the last calculation, the theorem would have been  $\frac{-dr}{-2ad - r}$

$= f$ ; or, changing all the signs, (which are here negative, because the distance is more than infinite, that is, the rays

more than parallel,) the same may be taken  $\frac{dr}{2ad + r} = f$ ,

or  $\frac{417.25 \times 21.5}{2 \times 0.599 \times 417.25 + 21.5} = 17.204$ , which is less

than the solar focus by 0.74 of an inch. In this case the rays must have passed through some other glass, in order that they may proceed in a state of convergence before they enter the lens in question, and the focus of that other glass is here considered as the *radiant* point from which the rays proceed in a state of convergence; and this consideration leads us naturally to inquire into the nature of a focus when two glasses are employed jointly to produce it, under the different circumstances of figure and distance.

Suppose the parallel rays A N and B M, in *fig.* 8, to fall on a plano-convex lens M N, with the curved face turned to the radiant, and to be refracted to its focus at F; then if another plano-convex lens be placed in the line of its axis, at any distance less than C F, so as to intercept the converging rays, they will be refracted still more, and will now converge into the

shorter focus  $f$ , which is therefore called the *compound focus* of both the lenses. The angle subtended at  $f$ , where the eye is supposed to be placed, and which is called the optic angle, is now larger than that formed at F by the first lens, and is equal to what would be formed by the imaginary double convex lens E E, the focal distance of which would be Qf. Now let C F be put = F for the focal distance of the lens N M; O P =  $y$  for the focal distance of lens G H; and Qf =  $x$  for the focal distance of the imaginary double convex lens E E: also let O f, the compound focal distance, be =  $f$ ; and C O, the distance between the lenses N M and G H, be = D. As the rays, which tend to the point F, after leaving the lens N M, fall on the lens G H *converging*, let us call O F =  $d$ , and then, by common optics, we shall

have  $d = \frac{yf}{y - f} = F - D$ ; from which equation we get

$F + y - D : F - D :: y : f$ ; and from this analogy the compound focal distance O f is easily obtained. In like manner, the parallel rays L G and S H are refracted by the lens G H, now supposed to be the first lens, to the lens N M, as they proceed towards the point  $i$ ; but are refracted to the nearer point  $\phi$ , which is the compound focus on the

other side; and now we have  $C\phi = \frac{F\phi}{F - \phi} = \phi - D$ ;

whence  $F + y - D : y - D :: F : \phi = C\phi$ , which is therefore known again, because of the similar triangles F N C, F G O, and  $f E Q, f G O$ ; and because  $E Q = N C$ , we have  $C F : O F :: N C (= E Q) : G O :: Q f : O f$ ; that

is,  $F : F - D :: x : f$ ; and, therefore,  $\frac{Ff}{F - D} = x$ . But

we had above  $\frac{F - D \times y}{F + y - D} = f$ ; which being substituted

for  $f$ , will give  $\frac{Fy}{F + y - D} = x$ ; from which theorem our

problem for finding the compound focus of two lenses, or rather the focus of one lens, that shall have the same focal distance and visual angle as two given ones placed at a given distance shall have together, may be thus found: *viz.* "divide the *product* of the two focal lengths of the given lenses by their *sum*, lessened by their *distance*, and the quotient will be the focal length of the single lens, as required." By way of exemplification, let the focus of N M be put = 6 inches, and that of G H = 4; and then, supposing the curved surfaces turned to the radiant, which is called the best position, as will be seen hereafter, and the distance = 2, we shall have, by the theorem for

this purpose,  $\frac{6 \times 4}{6 + 4 - 2} = \frac{24}{8} = 3$  for the focus in ques-

tion; but if the distance had been = 3, then the result would have been  $\frac{6 \times 4}{6 + 4 - 3} = \frac{24}{7}$ , or 3.42 nearly. But if

the distance had been made 4, equal to the focal distance of the lens G H, the compound focus would have been 4 also; and if 6, equal to the focal distance of the lens N M, the compound focus would still have been 6, without any gain of magnifying power in either case, over what would have accrued from the respective single lens; also if the lenses are brought into contact, that is, if D = 0, then we shall have the compound focus the shortest possible, *viz.*

$\frac{6 \times 4}{6 + 4 - 0} = \frac{24}{10} = 2.4$ . But *distinctions* is an object

of as much importance as magnifying power; and it will be seen hereafter, that there is a certain distance between the lenses that promotes this quality the most possible, whatever be the radii of the two lenses. This condition is fulfilled when  $x$  is  $= \frac{1}{2} F$ , that is, when the focus of the imaginary lens  $E E$  is just one half of that of the outer lens  $N M$ ; in which case the compound focus  $f$  will be in the middle of the line  $O F$ , and the lens  $G H$  placed at half the focal distance of the imaginary lens. But it is not necessary that the object, or image of an object  $uv$ , should be situated in the exterior compound focus  $\phi$ : this focus may be supposed negative, that is, the image may be between the two lenses  $M N$  and  $G H$ , as  $B A$  in *fig. 11.* which will always be the case when  $D$  is greater than  $y$ ; or, in other words, when the distance between the two lenses exceeds the focal distance of the inner lens  $G H$ ; for let

$$F = 6, D = 4, \text{ and } y = 2, \text{ and we shall have } \frac{6 \times 2}{6 + 2 - 4} = \frac{12}{4} = 3, \text{ as in the first instance. Neither is it necessary that}$$

both the lenses be convex or plano-convex, nor yet with the same face outwards; for suppose  $N M$  concave, when its focus will be *negative*, or virtually on the opposite side of it, and must be expressed by  $- F$ ; in this case the theorem becomes

$$\frac{- F y}{y - F - D} = x, \text{ for the focus of the imaginary lens } E E$$

that shall have its focus equal to the compound focus, which will always be *positive* while  $F + D$  is greater than  $y$ , but when less, then *negative*; and when  $y = F + D$ , the rays proceed parallel, and the focus is said to be *infinite*. The

$$\text{compound focal distance in this case is } \frac{- F x - D x}{- F} = f,$$

and must be affirmative when  $x$  is so; but when  $D = 0$ , then  $f = x$ . As an example, let the concave  $N M$  have a negative focal distance  $- F = 3$ , and let  $y = 2$ , while  $D = 1$ ; then the focal distance of the imaginary or equal lens will be

$$\frac{- 6}{2 - 4}, \text{ or } \frac{- 6}{- 2} = 3 = x, \text{ and the compound focal distance will be } \frac{- 3 \times 3 - 1 \times 3}{- 3}, \text{ or } \frac{- 12}{- 3} = 4 = f. \text{ Whence, in}$$

this case,  $f o$  is equal to  $2 F O$ , whereas when  $N M$  was convex, we had the reverse,  $F O = 2 f o$ . When  $- F = y$ , and  $D = 0$ , i. e. when a concave lens and convex one are placed in contact, with their separate focal distances equal, then  $x$  becomes infinite, or, in other words, the rays emerge, and proceed in a parallel direction; but if the focal lengths are unequal, there will be a positive focus and magnifying power, when the convex has the shorter radius; for suppose  $- F = 3$ ,  $y = 2$ , and  $D = 0$ , then by the theorem

$$\frac{F \times y}{F - y}, \text{ we shall have } \frac{- 6}{- 1} = 6 = x, \text{ and in this case } x =$$

$f = 6$  likewise. From these instances it will be seen, on examination, that the *compound focal distance*  $O f$ , of the combined lenses, is nothing more than the focal distance  $f$ , found

$$\text{by the common geometrical theorem of optics, } \frac{dr}{d - r} = f,$$

adapted to the constant lens  $G H$ , where  $O F = r$ , and  $O P = f$ , when the rays are *diverging*; or  $O f = - f$

$$\left( = \frac{- dr}{- d - r} \right) \text{ when the rays fall diverging on the said lens.}$$

See Table II.

Our general theorem may be rendered more extensive in its application, by varying it according to the data; thus,

$$\text{if } F, x, \text{ and } D \text{ be given to find } y, \text{ it will be } \frac{F x - x D}{F - x} = y;$$

$$\text{to find } F \text{ with the others given, it will be } \frac{x D - x y}{x - y} = F;$$

$$\text{and to find } D, \text{ there will be } F + y - \frac{F y}{x} = D. \text{ From}$$

these analogies we may further observe, that we have also the ratio of the two compound focal distances to each other,  $O f$  and  $C f$ , thus; as  $f : \phi :: F - D \times y : y - D \times F$ ; and, therefore, when  $f = \phi$ , then  $F = y$ ; or the said focal distances can never be equal, but when the lenses are equal. Lastly, we may observe, that since the parallel rays  $L G$ ,  $S H$ , refracted through both the combined lenses, intersect the axis in the same point,  $\phi$ , as it would do if it were refracted by the single lens  $E E$ , as is evident by continuing it to  $R$ ; therefore, since  $G O = R Q$ , it will follow that the diameter  $I K$ , of the principal pencil of rays  $K \circ I$ , diverging from the focus  $\phi$ , will be the same as it would have been, if it had proceeded directly to the single lens  $E E$ ; and, consequently, this combination of lenses makes no alteration in that respect.

Having now explained how the focal point of any lens, or pair of lenses, differently circumstanced, may be ascertained by one or other of the dioptric theorems, derived from the refractive power of glafs agreeably to certain laws of nature, it will be proper to explain the different senses in which the word *focus* is applied by optical writers under different circumstances, that our readers may not be at a loss to know in what sense it is to be taken, whenever it occurs in our subsequent details. The *principal* or *solar* focus of a lens, is that which is produced by parallel rays coming from an infinite distance, which that of the sun may be considered, and when the epithet *refracted* is added, it has reference to the particular glafs by which the rays are refracted; but when *geometrical* is expressed or understood, then glafs in general is meant: the *virtual*, refracted, or geometrical focus, is that which, in a concave glafs, would be formed by the diverging rays continued to a point backwards through the glafs till they meet, and is imaginary rather than real, and generally called *negative*: the focus arising from converging rays passing through a convex lens is shorter, or nearer the lens, than the solar focus, and the radiant is supposed to be at a greater than an infinite distance, if such an expression is allowable; but as no such distance is in nature, converging rays can only be produced by their passage through a first lens before they fall on a second, which is often the case in the construction of optical instruments: but the focus from diverging rays is always more remote than the solar focus from the lens that produces it; and, in consequence of the reference it has to the situation of the radiant or illuminated object, is denominated the *proper* and sometimes the *relative* focus; for as the radiant approaches the lens, the proper focus recedes in the same line, and *vice versa*, as we have more fully explained under the article *LENSES*. Because the radiant and corresponding focus may change places at any time, the two points where they are placed, at opposite sides of the lens, are called the *conjugate* foci, from their being so closely allied, that one cannot move without the other. When the radiant is placed therefore in the *principal*

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pal or solar focus of a lens, the rays will emerge and continue parallel, on account of the other conjugate focus being at an infinite distance; and for the same reason, when an object, viewed by a single lens, is placed in its principal focus, the rays will enter the eye in a parallel state, and will be converged to a point on the retina by the humours of the eye, and a number of these rays crossing will form a picture behind the eye of the object viewed: for, what is one of the most remarkable properties of refracted rays coming from a luminous object, they bring with them not only the figure, but the colours of the object viewed, and form a picture or image of it, in the place where the different pencils of rays cross one another; and, what is equally remarkable, this picture is not visible until all extraneous light is excluded. We will not pretend to explain this wonderful property of a lens, that directs the transmitted rays so as to form a picture of a distant object in its focus, but merely mention here, that, without it, no telescope, microscope, camera obscura, or magic lantern, could be constructed on dioptric principles.

After having shewn, by our foregoing theorems, how any focus, solar, proper, conjugate, or virtual, may be determined of a single lens, or of a combination of two lenses with the intermediate distance given, the same might be done for any number of lenses, by considering the compound focus of the first two lenses, as the focal distance of a single lens, to be combined with the third lens, and so on till all the lenses are included. Dr. Smith has given, in his Optics, chap. v. the application of Cotes's theorem "for determining the apparent distance, magnitude, situation, degree of distinctness and brightness, the greatest angle of vision and visible area of an object seen by rays successively reflected from any number of plane or spherical surfaces; or successively refracted through any number of lenses of any sort, or through any number of different media, the surfaces of which are plane or spherical, with an application to telescopes and microscopes;" which account our readers may consult with advantage: but as the illustrations and demonstrations demand more plates than can be given to this article, in addition to the eight we have had occasion to introduce, we have been obliged merely to refer to them in this place.

We propose, however, to substitute some practical theorems, derived from our tables, which we have been favoured with by Mr. Tulley, that will be found extremely useful to the working optician, who must be supposed, generally speaking, unable to transform the theorems which we have given in our tables, for the purpose of finding the focal distance of a lens, or of a combination of lenses already constructed; and which tabulated theorems are principally useful for determining the powers, and for explaining the construction of an instrument to which they are applicable.

### Practical Theorems.

1. When  $r$ , the radius of one face of a lens, is given, and  $F$ , its principal geometrical focus, to find  $R$ , the radius of the other face, the theorem is  $\frac{rF}{2r - F} = R$  for a double convex: thus, let  $r = 9$ , and  $F = 10.3$  inches, and the calculation will be  $\frac{9 \times 10.3}{9 \times 2 - 10.3} = \frac{92.7}{7.7} = 12$  nearly, the truth of which may be proved by our theorem for parallel rays with a double convex lens, in Table II. viz.  $\frac{2rR}{R+r}$ , or

$$\frac{9 \times 12 \times 2}{9 + 12} = \frac{216}{21} = 10.3, \text{ as before very nearly, for the}$$

required focus; and when the refractive power or ratio between the sines of incidence and of refraction is given, this geometrical may be converted into the refracted focus by the quantity  $2a$ , used as a divisor; or, on the contrary, the refracted focus may be turned into the geometrical focus by using  $2a$  as a multiplier.

2. With a meniscus lens, where  $r$ , the convex side, is given, together with  $F$ , the theorem is  $\frac{rF}{F - 2r}$  for finding  $R$ , the concave side.

3. But when the concave side of a meniscus is given with the focus, to find the convex, the theorem becomes  $\frac{rF}{2r + F} = R$ .

4. When the focus of a double convex lens, and the ratio between its two radii, are given, to find the actual radii  $r$  and  $R$  respectively, first our theorem in Table II.  $\frac{2rR}{R+r} = F$ ,

will give the focus, on a supposition that one side is unity, and the other any given quantity that forms the other term of the ratio; suppose as  $1:4$ ; thus  $\frac{1 \times 4 \times 2}{1 + 4} = 1.6$ , the

rational focus; then suppose the focus given = 12, and there will be this analogy, as  $1.6:1 :: 12:7.5 = r$ ; and also as  $1.6:4 :: 12:30 = R$ , or otherwise  $\frac{12}{1.6} = 7.5$ , and

$7.5 \times 4 = 30$  will be the respective radii  $r$  and  $R$ , as before.

5. When the compound focus of two convex lenses, and the separate focus of one of them, are given, to find the separate focus of the other, that shall be suitable to form the combination; if we put  $f$  = the focus of the lens given,  $F$  = the combined focus, and  $x$  = the focus of the lens required,

the theorem for this useful purpose is  $\frac{fF}{f - F} = x$ ; for example, let  $f = 36$ , and  $F = 15$ , then  $\frac{36 \times 15}{36 - 15} = 25.7$

nearly, for the focus of the lens required, which is a positive focus, because both lenses are double convex, and might be plano-convex, or one double convex and the other plano-convex, or even meniscus, as the ratio of the radii  $r$  and  $R$  may be disregarded when the focus only is the object of consideration. But whatever be the forms of the curves relatively,  $F$ , the compound focus of two lenses, or more, will, in practice, be the refracted focus; and, therefore, in this theorem,  $f$  and  $x$  will also be the refracted foci of the separate lenses, and, consequently, when the geometrical focus of  $f$  is given, it must be converted into the refracted focus by the divisor  $2a$ , before the calculation is entered upon; it being necessary that all the terms be of the same denomination.

6. If  $F$ , the compound focus, be longer than  $f$ , the focus of the given convex lens, as is the case in the construction of a double achromatic object-glass, then the lens required will be concave, of which the focus  $x$  is sought, and the theorem becomes  $\frac{fF}{F - f} = x$ . Let us, in this example,

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reverse the numbers of  $f$  and  $F$ , as taken above, by making  $f = 15$ , and  $F = 36$ ; and then, as before, there will be

$$\frac{15 \times 36}{36 - 15} = 25.7 = x, \text{ the negative focus of the concave}$$

lens required, which may also have any ratio of its curves, or be a plano-concave, provided its focus be that which has been here determined.

Likewise it must be recollected, that when a positive focus is required from an union of two lenses, one convex and the other concave, the focus of the convex must be shorter than that of the concave; or, in other words, the refractive power, depending on the thickness of the lens, when the same glass is used for both lenses, must predominate in the convex; for it is the difference of the opposite refractions that brings the rays finally to a focus: consequently, if the foci are alike, the rays, being refracted alike in opposite directions, will become parallel, or have what is called an infinite focus: and also, if the focus of the concave be made the shorter of the two, the rays, after opposite refractions, will absolutely diverge by the difference of these refractions, and have an imaginary focus, called a virtual or negative focus, at the other side of the compound lens.

7. If the lens given be concave, and a convex one be required to produce a given compound focus, which is another case in the formation of an achromatic object-glass, the

theorem will be  $\frac{fF}{F+f} = x$ , where  $f$  is the focus of the

concave, and might be put  $-f$ , to denote its being a negative focus, and  $x$  the focus of the convex lens. Let us put  $f = 25.7$ , and  $F = 36$ , as above, and then there will

$$\text{be } \frac{25.7 \times 36}{36 + 25.7} = \frac{925.2}{61.7} = 15, \text{ very nearly, for the focus } x$$

of the convex required; which, as we have said, must be the refracted focus, and also  $f$  of a like denomination, in order to make the refracted compound focus suitable for a tube of thirty-six inches.

8. If the compound focus should be required to be *negative*, or to have the refraction of the concave lens to predominate, when the convex lens is given with the compound

focus, the concave may be found by this theorem  $\frac{fF}{F+f}$

$= x$ , as in the last; but then  $x$  here is the focus of the concave lens, which therefore will be 15 when that of the convex is 25.7, and the negative focus, as before, 36.

9. But if the given lens be concave, and the compound focus be required negative, the focus of the convex sought

will be had by this theorem  $\frac{fF}{F-f} = x$ , as in the sixth

theorem; the focus  $x$  is here, however, that of the convex, which in the other was that of the concave; so that when  $f = 15$ , and  $F = 36$ ,  $x$  will be again = 25.7, but negative.

In all these cases, the two lenses are supposed to be in contact with each other; but if  $D$ , the distance between them, which is a variable quantity, were given, similar theorems

might be formed from our general theorem  $\frac{fF}{f+F-D}$

above explained, where, in any position of two convex glasses,  $f$  is the focus of one lens,  $F$  the focus of the other, and  $D$  the distance between them, with a positive compound focus; but if one of the two lenses be convex, and the other concave,

the general theorem becomes  $\frac{fF}{f-F-D}$  or  $\frac{fF}{F-f-D}$ ,

accordingly as  $F$ , put for the concave, or  $f$ , put for the convex, is the larger: the former theorem being the "*product* divided by the *sum* of the foci, lessened by the *distance*," and the latter the "*product* divided by the *difference* of the foci, lessened by the *distance*." Hence, by a transposition of one or other of the forms of this general theorem, the data and postulata may be varied as occasion may require. The first form is applicable in cases where sliding eye-pieces, or a sliding secondary object-glass, are used in a telescope, which plans have been recommended and adopted by Dr. Brewster, as we shall see hereafter.

In considering the theory of a telescope, (of either the refracting or reflecting sort,) our attention must be directed to two essential particulars, the *image* of an external object formed at the focus of the object-glass, or of the large speculum, as the case may be; and the *means* by which this image is rendered visible to the eye of an observer: and accordingly as the dimensions, shape, quality, arrangement, and number of the lenses and specula vary from each other, may the constructions be said to differ, though the effect to be produced be intended to be the same. That telescope, of whatever construction, must be considered the most perfect, which exhibits to the eye an image of distant objects the most distinctly, as to light, colour, shape, and proportion; and which, at the same time, amplifies this image sufficiently to afford a minute examination of it, in a field of view that is proportionably large to contain it. That quality, which apparently amplifies the object, or rather the image of the object, by enlarging the angle subtended at the pupil of the eye, therefore called the *visual angle*, is denominated the *power* of the telescope; and in all telescopes, whatever their other qualities may be, the *light* is *diminished* as the *power* *increases*, so that in every telescope there is a limit to its useful power, which depends on the quantity of light emitted or reflected by the object to be viewed; and it would answer no good purpose to increase the power so much, that a corresponding deficiency of light may render the object invisible. Hence different powers may be applied, with advantage, to objects differently illuminated; and hence different eye-pieces are usually appropriated to the same telescope, particularly when it is destined for celestial, as well as for terrestrial observations. But we proposed to explain first the theory of those telescopes which are usually called *refracting* or *dioptric*, and afterwards of *cata-dioptric*, or those that magnify by the aid of *reflection*.

Under our article LENS we have said (in section 5.) that "the images of objects, opposed in any manner to a convex lens, are exhibited invertedly in its focus," and that "they will be represented distinctly, and in their natural colours," on a paper held at the opposite side of the glass, at nearly the distance of its proper focus, especially if the room be darkened; and in section 7. we have said, that "the diameter of the image of an object delineated beyond a convex lens, is to the object itself, in the ratio of the distance of the images to that of the object;" so that the more distant an object is from the lens, the smaller is the image of that object; and also the shorter is the focus of the lens, until the distance is such, that the rays fall on its surface parallel, or nearly so. Likewise (in section 8.) we have shewn, that "if the eye be placed in the focus of a convex lens, an object viewed through it appears erect and enlarged in the ratio of the distance of the object from the eye, to that of the eye from the lens, if it be near; but infinitely, if remote:" and what is said of an object itself, when viewed through a convex

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convex glass, is equally true of the *image* of an object so viewed. It is easy, therefore, to conceive, how two lenses of different focal lengths may be so arranged as to make a telescope that will at the same time invert and amplify, as to sense, a distant object: for, first, a lens of a long focal distance will form a large image of the object opposed to it, which image, by the crossing of the rays at the focal point, will be inverted a little beyond the solar focus: and secondly, an eye applied to a lens of short focal distance, which is held so that its focal point may coincide with that of the larger lens, will receive parallel rays, and will shew the said image in an amplified or magnified state, and in the same inverted position in which it is exhibited; which image, by being enclosed in a darkening tube, appears with all its natural colours. The power of such a telescope, which is the simplest that can be made, is ascertained by finding how often the focal length of the small or eye-lens is contained in the focal length of the larger or object-lens; the quotient of such division will represent the *power*. But if the eye-lens be made concave, and placed within the focal point of the object-lens, as much as is equal to the virtual focus of the concave lens, then the converging rays will become parallel, and afterwards, on entering the eye, which may be considered as a lens of short focus, will converge, and form a direct image on the retina; and though the total length of the telescope will be shortened by this latter arrangement, by twice the focal length of the eye-lens; yet if the virtual focus of the concave eye-glass be the same as the focal distance of the convex lens, the power will be the same, and may be ascertained by the same process. With a convex eye-glass, the instrument arising out of the first arrangement is the original *astronomical* telescope, and that arising out of the second is the *Galilean*. The field of view in the former construction is directly as the effective breadth of the eye-glasses, and inversely as the interval between the lenses; but in the latter, the field is directly as the diameter of the pupil of the eye, and inversely as its distance from the lens.

In both these constructions, the smallest power, or, which is the same thing, the shortest focus of the object-glass is with parallel rays; and as the distance of the object, or radiant point, decreases according to the principles of optics laid down under LENS, the focal distance of the object-glass increases: and thus the power increases as the rays become more and more diverging, from a gradual decrease of distance; so that, in fact, the same telescope magnifies a near object considerably more than it does a distant one; for while the focus of the object-glass increases after a certain law, inversely as the distance decreases, the focus of the eye-glass remains unaltered; and, consequently, the power varies inversely as the distance, or directly as the variable focus of the object-glass.

To remedy the inconvenience of inversion of the object in the astronomical telescope, and also of the contracted field of view of the Galilean, two more glasses were added to the eye-tube, as we before stated, to render the image of the object *erect*, or rather to form a second image in a contrary position. The primary intention of these two additional eye-glasses was not to alter the power, but merely to give an erect position to the apparent object; the original lens therefore remained as before, and was called the *field-glass*, as being nearest to the field of view of the old arrangement of two glasses, while the next glass was called the second eye-glass, and was placed at double its focal distance from the field-glass, so that the rays might be parallel, and that it might form another image in its focus: this being the image of an image, was denominated the secondary image, and became erect by a second crossing of the rays, and was then

viewed through the outermost or first eye-glass, in the same manner as the first or inverted image was viewed through the original eye-glass. This telescope was denominated the *terrestrial* telescope; and while the foci of all the three eye-glasses were similar, its power and field of view remained the same as in the astronomical telescope.

The theory of these three constructions will be more clearly understood by a reference to *Plate XXV. of Astronomical Instruments*, in which *fig. 1.* shews the arrangement of the glasses in the astronomical telescope; *fig. 2.* that of the glasses in the Galilean, and also in the common opera-glass, except that in it the object-glass is usually achromatic; and *fig. 3.* exhibits the system of glasses that compose the original terrestrial telescope, or perspective glass, before the subsequent improvements took place. In all these figures the same letters denote the same parts, as far as they extend; and the magnifying power of each may thus be demonstrated to be as we have before stated it. Let *AB* represent the object-glass, and *CD* the eye-glass of *fig. 1.*; and let *HFI* and *GFM* be considered as two pencils of light, proceeding in straight lines from the opposite ends of a distant arrow, and crossing each other at the centre *F* of the said object-glass; also let the dotted line be a pencil coming from the middle of the arrow, and falling perpendicularly on the same central point, so as to pass along the axis of the glasses *FLE*. Under these circumstances, the angle *GFH = IEM*, the opposite angle, is that under which the arrow appears to the natural eye at *F*; but the angle *IEM = CKD*, is that under which the image *IM* of the distant arrow is viewed, when magnified by the eye-glass *CD*. But the angle *IEM* is to the angle *IFM*, as *LF* to *LE*, or as the focal distance of the object-glass to the focal distance of the eye-glass; therefore

$$\frac{LF}{LE} = \text{the power, as before stated; and as the lenses } CD,$$

*NO*, and *TU*, in *fig. 3.* have equal foci, the secondary direct image *PQ* is equal to the primary inverted one *IM*, and appears under the same angle.

Now if all the rays of light had been, as they were supposed to be before sir Isaac Newton's experiments, homogeneous; and if a double convex lens, of equal curvature on both sides, had been found to refract all these homogeneous rays into one focal point, without any aberration, either lateral or longitudinal; then the telescopes, we have just noticed, would have been sufficiently perfect for all the purposes of exhibiting a well-defined picture of the object viewed in a magnified state; and the power might have been increased to almost any extent, by varying the ratio between *FL* and *EL*; that is, by increasing the focal distance of the object-glass, or by lessening the focal distance of the eye-glass, or by both; but it was soon found that the rays which enter a lens at or near the edges, are refracted to a point nearer to its surface than the rays that are transmitted near the centre; and also that the rays of different colours are differently refracted, even from the same point of the lens, so as to meet in the line of the axis at different distances from the nearest surface of the lens. The former of these deviations, being occasioned by the spherical figure of the lens, is called the *spherical aberration*; and the latter, arising out of the nature of solar light itself, is called the *prismatic, chromatic, or Newtonian* aberration. The indistinctness in the formation of the image, occasioned by these aberrations of the rays of light, became an object of sir Isaac Newton's attention, and he soon discovered that, whatever mechanical means might effect in the shape of the curve that might rectify the spherical aberration, the prismatic aberration would

remain so long as one substance only remained to be the medium of refraction. The ingenious Huygens, however, supposing that the diminution of the spherical aberration would contribute greatly to the improvement of the telescope, instituted some experiments and calculations, which greatly promoted the science of Dioptrics. He found, that the lengthening of the radius of convexity of an object-glass shortened the versed sine of the curvature, or lessened the thickness of the glass, on which, with equal apertures, the spherical aberration seemed to depend; and also that, in a simple eye-glass, the aberration from the figure was greatest in a double convex lens, when the curves of the two faces were from the same radius; and also that it increased as the radius shortened. The ratio 1 : 1 being found to have the greatest aberration, and 1 : 2 to have less, an investigation was instituted, from which it was at length proved, that the aberration in a double convex lens is the smallest possible, when the radii of convexity are to each other as 1 : 6; the face 1 being turned to the radiant or object to be viewed. From these experiments originated the famous Huygenian telescope of 123 feet focal distance, and a table of apertures corresponding to the respective focal lengths of the object and eye glasses, that would exhibit an image equally well defined: which calculations were the basis of all the long or aerial telescopes that were in repute for a whole century; but which are now superseded by the short achromatic refractors.

The same ingenious author of *dioptrics* discovered, that the aberration arising from the curved figure of a lens might be still further diminished, by substituting two lenses in the eye-piece of a telescope instead of one; which discovery was the foundation of all the improved eye-pieces that have been since adopted, under different arrangements of intermediate distance, and with different degrees of curvature. But before we can explain how the indistinctness arising from both the spherical and prismatic aberrations of mixed rays, may be in a great measure counteracted, (on which important consideration, the excellence of modern improved telescopes depends,) it is necessary to examine this subject further, and to shew how the circle of aberration of mixed rays arising from their unequal refrangibility, and also the lateral and longitudinal aberrations arising from the spherical figure of refracting and reflecting surfaces, may be mathematically determined. In doing this, we shall avail ourselves of Dr. Smith's propositions, which are at the same time perspicuous and conclusive.

PROP. I.

*Aberrations.*—"Let the common sine of incidence be to the sine of refraction of the *least* refrangible rays, as I to R, and to the sine of refraction of the *most* refrangible rays, as I to S; and the diameter of the least circular space, into which heterogeneous parallel rays can be collected by a spherical surface, or by a plano-convex lens, will be to the diameter of its aperture in the constant ratio of  $S - R$  to  $S + R - 2 I$ ."

For let an heterogeneous ray PA (*Plate XXVI. fig. 1.*) fall upon a spherical surface ACB, and let it be separated by refraction into the rays AF, Af, cutting the axis EC, drawn parallel to PA, in F and f. Take the arc CB equal to CA, and let another heterogeneous ray PB, coming parallel to PA, be refracted into the lines BF, Bf, cutting the two former rays in R and S. Join RS, and produce it till it meets the incident rays produced in I and K, and the perpendiculars EA, EB, to the refracting surface at the points A, B, in H and L. And when AB, the breadth of the aperture or of the pencil, is but moderate, and consequently the refractions at AB but small, the angles of incidence and

refraction HAI, HAR, HAS, or the arcs that measure them, or their perpendicular subtenses HI, HR, HS, will be to each other very nearly in the same given ratios as those of the sines I, R, S, of those angles. And disjointly, the differences of those subtenses will be proportionable to the differences of those sines; that is, the line RS : RI ::  $S - R$  :  $R - I$ , and doubling the consequents, RS : 2 RI or IK - RS ::  $S - R$  :  $2 R - 2 I$ ; and conjointly, RS : IK, or AB ::  $S - R$  :  $S + R - 2 I$ . From this given ratio of RS to AB, in which they increase or decrease together, it appears that all the intermediate rays which fall upon AB, will pass through RS. And when parallel rays fall perpendicularly upon the plane side of a plano-convex lens, they are refracted only at their emergence from its convex surface; and so the aberrations are the same in both cases. Q. E. D.

*Corol. 1.*—Hence the diameter RS, of the circle of prismatic aberrations that contains all the incident rays, is a 55th part of the diameter AB of the aperture of a plano-convex glass, whatever be its focal distance. For supposing with Newton the prismatic spectrum divided into seven colours, and AR and AS to be the outermost red and violet rays, their sines of incidence and refractions I, R, S, are to each other as 50, 77, 78. Whence  $S - R$  is to  $S + R - 2 I$ , as 1 to 55.

*Corol. 2.*—The diameter of the least circle that can receive the rays of any single colour, or of several contiguous colours, is also determinable from the proportions of their sines. Thus all the orange and yellow is contained in a circle, whose breadth is the 260th part of the breadth of the aperture of the plano-convex glass; the sines of the outermost orange AR, and yellow AS, being to the common sine of incidence, as  $77\frac{1}{2}$  and  $77\frac{1}{2}$  to 50.

*Corol. 3.*—In different surfaces, or plano-convex glasses, the angles of prismatic aberration RAS are as the breadths of the apertures A, B, directly, and as the focal distances C, F, inversely; because any angle, as RAS, is as its subtense RS directly, and as its radius AR or CF inversely.

*Lemma.*—The versed sines AB, AC, of very small arcs BD, CD, (*figs. 2. and 3.*) of unequal circles BDG, CDH, that have the same right sine AD, are reciprocally proportionable to their diameters BG, CH, very nearly; that is, AB : AC :: CH : BG.

For since the rectangles under BAG and CAH are each equal to the square of AD, and consequently to each other, their sides are reciprocally proportionable; that is, AB is to AC as AH to AG, or as CH to BG very nearly, when the versed sines are incomparably less than the diameters themselves. Q. E. D.

PROP. II.

"When homogeneous parallel rays NA, EC, (*fig. 4.*) fall upon a spherical surface AC, whose centre is E, the longitudinal aberration FT, of any refracted ray AT from I, the focus of the pencil, is to the versed sine of the arc AC, intercepted between the point of incidence and the axis ECF, in the given ratio of the square of the sine of refraction, to the rectangle under the sine of incidence, and the difference of the sines very nearly; and the aberration is the same when the rays fall perpendicularly upon the plane side of a plano-convex lens."

For when the refraction is made in the passage of a ray NA from a denser to a rarer medium, then the intersection T, of the refracted ray AT, with the axis ECF, lies between the refracting surface and its focus F. With the centre T and semi-diameter TA, having described the arc AD, cutting the axis in D, draw the sine AP of the arcs AC,

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A C, AD, and also E N and E M, the lines of incidence and refraction, for which put  $n$  and  $m$ ; then because the triangles E T M, A T P, are similar, it will be as E T : T A or T D :: (E M : A P or E N ::) E F : F C; and disjointly, T F : E F :: (F C - T D or) T F - C D : F C; and alternately, T F : T F - C D :: E F : F C; and disjointly, T F : C D :: (E F : E C ::)  $m : m - n$ . Again, since (P D : P C :: C E : D T or F C and conjointly) C D : C P :: (E F : F C ::)  $m : n$ ; by compounding this and the foregoing proportion, it will be as T F : C P ::  $m m : m - n, n$ . Q. E. D.

*Corol. 1.*—The segment A C B P A may be considered as a plano-convex lens; and when rays fall parallel upon its plane side, the longitudinal aberration of the extreme ray falling upon A is equal to  $\frac{2}{3}$  of its thickness P C, as appears by putting 3 and 2 for  $m$  and  $n$  respectively.

*Corol. 2.*—Also this aberration  $F T = \frac{m m}{m - n, n} \times \frac{A P^2}{2 E C}$   
 $= \frac{m m}{m - n} \times \frac{A P^2}{2 C F}$ . For  $P C = \frac{A P^2}{2 E C}$  very nearly, and  
 $E C = \frac{m - n}{n} \times C F$ .

*Corol. 3.*—Let the refracted ray A T G produced, cut the line F G, perpendicular to the axis, in G, and the lateral aberration  $F G = \frac{m m}{n n} \times \frac{A P^3}{2 E C^2} = \frac{m m}{m - n} \times \frac{A P^3}{2 C F^2}$ . For  
 $F G : T F :: A P : T P$ , or  $C F$  or  $\frac{n}{m - n} \times C E$ .

*Corol. 4.*—When the semi-diameter of the convexity or the focal distance is given, the longitudinal aberrations arising from the figure are as the squares, and the lateral aberrations as the cubes, of the linear apertures of a plano-convex lens.

### PROP. III.

“When parallel rays Q A, E C (*fig. 5.*) are reflected from a spherical concave A C B, whose centre is E, and whose aperture, A C B, is but small, the longitudinal aberration T F, of the extreme ray A T, from the geometrical focus F, is equal to half the versed sine C P of the semi-aperture A C very nearly.”

In *fig. 4.* imagine E M, the line of refraction, to be diminished to nothing, and then to become negative and equal to E N, the line of incidence, and the refraction of the ray to be changed to reflection, as in *fig. 5.*; and by the former proposition it will be, as T F : C P ::  $m m : - m - n, n :: n n : - 2 n n :: 1 : - 2$ .

But the particular proof is this: By the last lemma, the versed sine C P nearly equals half the versed sine P D of the arc A D, whose centre is T, and semi-diameter T A or T E, or half the semi-diameter of the arc A C very nearly. But  $2 T F = 2 T E - 2 E F = E D - E C = C D$  exactly, or C P nearly. Therefore T F =  $\frac{1}{2}$  C P nearly.

*Corol. 1.*—We had  $2 T F = C D$  exactly, which is the excess of the secant E D of the arc A C above its radius E A. For joining A D, the angle D A E in the semi-circle D A E is a right one.

*Corol. 2.*—The longitudinal aberration  $T F = \frac{A P^2}{4 C E}$ .  
 For  $C P = \frac{A P^2}{2 C E}$  nearly.

*Corol. 3.*—The lateral aberration  $F G = \frac{A P^3}{2 C E^2}$ . For  
 $F G : F T :: A P : P T$ , or  $\frac{1}{2} C E$  nearly.

*Corol. 4.*—When the diameter of the concave or its focal distance is given, the longitudinal aberrations are as the squares, and the lateral ones as the cubes of the diameters of the apertures.

### PROP. IV.

“When parallel rays of any one fort are refracted by a plano-convex object-glass, or when rays of all forts are reflected by a spherical concave, the diameter of each circle of aberration caused by the sphericity of the figures, is equal to half the lateral aberration of the extreme ray in each, and therefore is given by the former propositions.”

Let a Y  $\tau$  be any refracted or reflected ray, cutting the axis E C T in  $\tau$  (*figs. 6 and 7.*), and the extreme ray A T G, that comes from the contrary side of the axis, in Y. Draw Y X perpendicular to the axis; and supposing the line A T G immovable, as the point of incidence  $a$  moves from the vertex C, the perpendicular X Y will first increase, because the angle C  $\tau a$  continually increases, and afterwards will decrease, because the line T  $\tau$  continually decreases; and when X Y is the greatest, it is evident that all the rays, incident upon the same side of the axis as itself, will pass through it. To find its greatest quantity, let the incident ray  $q a$  cut the chord A P B in  $\beta$ , and supposing the variable aperture P  $\beta = v$ , the variable T X =  $x$ , and the given lines P A =  $a$ , P T =  $f$ , T F =  $b$ ; by Cor. 4. Props. II. and III. the aberration F  $\tau$  is to the aberration F T ( $b$ ) as  $\pi a^2$  or P  $\beta^2$  ( $v v$ ) to P A<sup>2</sup> ( $a a$ ).

Wherefore F  $\tau = \frac{v v}{a a} b$ , and thence T F - F  $\tau = T \tau = \frac{b}{a a} \times \overline{a a - v v}$ . Again, P T ( $f$ ) : P A ( $a$ ) :: T X

( $x$ ) : X Y =  $\frac{a x}{f}$ ; also  $\pi a$  ( $v$ ) :  $\pi \tau$  or P T ( $f$ ) :: X Y  
 $\left(\frac{a x}{f}\right) : X \tau = \frac{a x}{v}$ . Hence again, T  $\tau$ , or X  $\tau + X T = \frac{a x}{v} + x = \frac{b}{a a} \times \overline{a a - v v}$  found before; or  $\frac{x}{v} \times \overline{a + v} = \frac{b}{a a} \times \overline{a + v} \times \overline{a - v}$ . Whence  $x = \frac{b}{a a} v \times \overline{a - v}$ ,

and therefore  $x$  or T X is the greatest possible when the rectangle  $v \times \overline{a - v}$ , or P  $\beta \times \beta B$  is greatest, that is, when its sides P  $\beta$ ,  $\beta B$ , are equal, or when  $v = \frac{1}{2} a$ . Substitute this value for  $v$  in the last equation, and it gives the greatest value of  $x = \frac{1}{4} b$ , or the greatest T X =  $\frac{1}{4} T F$ ; and therefore the greatest X Y =  $\frac{1}{4} F G$ , because T X : X Y :: T F : F G; and this X Y, turned about the axis P X, describes the circle of aberrations through which all the rays falling upon A B will just pass. Q. E. D.

### PROP. V.

“The circle of aberrations caused by the sphericity of the figure of the object-glass of a telescope, compared with the circle of aberrations caused by the unequal refrangibility of rays, is altogether inconsiderable.”

For if the object-glass be plano-convex, and the plane side be turned towards the object, and the diameter of a sphere, whereof this glass is a segment, be called D, and the semi-diameter of the aperture of the glass be called S, and the  
fine

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fine of incidence out of glass into air be to the fine of refraction as  $n$  to  $m$ ; the rays which come parallel to the axis of the glass shall, in the place where the image of the object is most distinctly made, be scattered all over a little circle,

whose diameter is  $\frac{m m}{n n} \times \frac{S^3}{D D}$  very nearly, if they were all

equally refrangible. As for instance, if the fine of incidence  $n$  be to the fine of refraction  $m$  as 20 to 31, and if  $D$ , the diameter of the sphere to which the convex side of the glass is ground, be 100 feet, or 1200 inches, and consequently the telescope about 100 feet long, and  $S$ , the semi-diameter of the aperture, be two inches; the diameter

of this circle of aberrations, that is  $\frac{m m}{n n} \times \frac{S^3}{D D}$ , will be

$$\frac{31 \times 31 \times 8}{20 \times 20 \times 1200 \times 1200} \text{ or } \frac{770661}{770666000} \text{ parts of an inch.}$$

But the diameter of the little circle through which these rays are scattered by unequal refrangibility, will be about the 55th part of the breadth of the aperture of the object-glass, which is here four inches. And therefore the aberration arising from the spherical figure of the glass, is to the aberration arising from the different refrangibility, as  $\frac{770666000}{770666000}$  to  $\frac{1}{55}$ , that is as 1 to 5449; and therefore, being in comparison so very little, deserves not to be considered in the theory of telescopes. If we suppose the little circle of aberrations arising from unequal refrangibility, to be 250 times narrower than the circular aperture of the object-glass, it would contain all the orange and yellow, and would permit the other fainter and darker colours to pass by it, which perhaps may scarcely affect the sense; yet even in this case, the aberration caused by the spherical figure, would be to the aberration caused by the unequal refrangibility, in a 100-foot telescope, but as  $\frac{770666000}{770666000}$  to  $\frac{1}{250}$ , or only as 1 to 1200, which sufficiently proves the proposition. Q. E. D.

*Corol. 1.*—If the focal distances and apertures of a reflecting concave and a plano-convex glass be both the same, the diameter of the circle of aberrations, caused by their figures, will be above 30 times less in the reflector than in the refractor.

For these diameters are  $\frac{\Delta P^3}{16 C F^2}$  and  $\frac{m m}{m - n^2} \times$

$$\frac{A P^3}{4 C F^2}; \text{ which are as } \frac{1}{4} \text{ to } \frac{m m}{m - n^3} \text{ or } \frac{31 \times 31}{11 \times 11}.$$

Hence, if the length of each telescope be 100 feet, the lateral aberrations in the reflector would be  $30 \times 5449$ , or 163470 times less than the lateral aberrations caused by unequal refrangibility in the refractor.

*Corol. 2.*—The number of pencils, some of whose rays are mixed together in every point of a confused picture, is as the area of the circle of aberrations of the rays in any one pencil; and consequently the mixture of the rays of different pencils, caused by the sphericity of the figure of an object-glass, if they were all alike refrangible, would be to their mixture caused by their unequal refrangibility, as 1 to  $5449 \times 5449$ , or 29691601 in the present instance. For conceiving any point in the confused picture to be a centre of a circle of aberration, it is manifest that all other equal circles of aberration, whose centres fall upon the first-mentioned circle, will cover its centre, that is, some rays of as many pencils will be mixed in this centre as there are points in the circle itself; or, which is the same thing, the number of pencils mixed in this centre is as the area of the circle of aberrations."

*Double achromatic Object-glasses.*—From these five propositions, and the corollaries deduced from them, in all of which the ratio of the fines of the angles of incidence and of refraction out of air into glass is taken as 3 : 2, (which answers nearly to the French plate-glass,) our readers will see, that when any single lens is used as the object-glass of a refracting telescope, there will be not only fringes of colour, but indistinctness in the image formed at its focal point, arising respectively out of the two kinds of aberration, the prismatic and the spherical. But Dollond has shewn, that these aberrations are not the same in all sorts of glass: the former depends on the dispersive power of the glass used, and the latter on the ratio of the radii of curvature of the two surfaces of the lens. The dispersive power of a prism of any specimen of glass will be to that of another like prism of a different specimen, as the lengths of the prismatic spectra, formed by them, are respectively to each other: and if the foci of two lenses of different dispersive powers, one convex, of crown-glass for instance, and the other concave, of flint, be made directly as their dispersive powers, and be placed contiguous, so that the convex lens may receive the rays first, and be of the shorter focus, or thicker, its dispersive power will be so counteracted by the opposite dispersive power of the other thin lens of longer focus, that the extreme or prevailing colours of the primary spectrum, being reversed, will both disappear; and a secondary spectrum, composed of the remaining intermediate colours, will be very inconsiderable in a good achromatic object-glass thus composed. If the refracted focal distances of the two lenses remain unaltered, when duly proportioned, as 2 : 3, or nearly so, the proportion of the radii of the surfaces may be altered at pleasure, so as to produce their due proportions of spherical aberration. To effect the desirable purpose of banishing the spherical aberration as much as possible, the optician is obliged to calculate the aberrations belonging to convex lenses of different unequal radii, in order to make the contrary aberrations of the concave as equal thereto as may be; and for this purpose the general theorem of Huygens is peculiarly adapted, which we shall, therefore, introduce and exemplify here, before we proceed to the construction of an achromatic object-glass. According to this theorem, if we put  $r$  for the radius of the first surface of any lens, or that which first receives the incident rays;  $R$  for the second surface; and  $T$  for the thickness of the lens: then the aberration arising from the figure of any lens, concave or convex,

$$\text{will be} = \frac{27 r^2 + 6 r R + 7 R^2}{6 \times r + R^2} \times T \text{ universally. (See}$$

Martin's New Elements of Optics, part vi. chap. iii. and Dr. Smith's Optics, book 2. chap. xiii.) When the centres of the curves are on opposite sides of the lenses, the signs are as here put down; but if these centres are on the same side as in a meniscus, then the sign of  $r$ , or of  $R$ , must be negative, as the case may require. For instance, let us first put  $r$  and  $R$  equal, and each = 1; then, as unity is not altered by multiplication or division, we shall have the

$$\text{simplest case, viz. } \frac{27 + 6 + 7}{6 \times 2 \times 2} = \frac{40}{24} = \frac{5}{3}, \text{ or } 1.66 \text{ of}$$

$T$ , for the longitudinal aberration, and it will make no difference which face of the lens is turned to the radiant. Secondly, let us take  $r = 1$ , and  $R = 2$ , in which case

$$\text{we shall have } \frac{27 + 12 + 28}{6 \times 9} = \frac{67}{54}, \text{ or } \frac{2}{3} \text{ of } T, \text{ very nearly.}$$

But if we reverse the sides in position, by making  $r = 2$ , and

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and  $R = 1$ , then the result will be different, *viz.*  $\frac{108 + 12 + 7}{6 \times 9} = \frac{127}{54}$ , or nearly  $\frac{1}{4}$  of  $T$ . The aberration

here is more than in the former position, in the ratio of  $127 : 67$ ; and this is, therefore, called the *worst* position; that being always called the *best*, where the first surface has a shorter radius than the second. If we suppose lenses of unequal radii to have their focal distances, their breadth, and consequently their thickness the same, it will be found, by a similar process, that their aberrations will diminish, as  $R$  continues to exceed  $r$ , until  $r$  is to  $R$  as  $1 : 6$ ; in which construction of a lens, placed in its best position, the aberration will be a *minimum*, *viz.*  $\frac{1}{36}$  of  $T$ ; but in its reversed or worst position, the aberration will be  $\frac{1}{36}$  of the same. A single convex lens, in its best position, has its aberration only  $\frac{1}{6}$  of  $T$ ; but with the plane side turned to the radiant, in which  $r$  may be said to be infinite, the aberration will be  $\frac{1}{2}$  of  $T$ . Also a double convex, when its radii  $r$  and  $R$  are to each other as  $2 : 5$ , has the same aberration as a single convex in its best position, and has less spherical aberration than any meniscus whatever; but there is no proportion of the radii of any one lens that will do away the spherical aberration altogether. If the refractive power of any glass be such, that the sines of incidence and of refraction are not exactly in the ratio  $3 : 2$ , the calculated longitudinal aberration will differ a little from the true one, so as to require a correction. And with respect to the lateral aberration, if  $m$  be the sine of incidence, and  $n$  the sine of refraction  $= 1$ , where two lenses have equal apertures and radii, then the errors arising from obliquity of incidence will respectively be as  $m^2$  in one, to  $'m^2$  in the other.

Likewise, we derive from the foregoing demonstrations of Dr. Smith the following general and important conclusions: first, that in lenses of equal apertures, the *longitudinal* aberrations, arising from figure, are *inversely* as the focal distances (see Cor. 2. of Prop. II. above quoted); and secondly, that under like circumstances, the *lateral* aberrations are *inversely* as the squares of the said focal

distances (see Cor. 3. of the same Prop.); and, on the contrary, that when the focal distances are the same, and the apertures differ, then the *longitudinal* aberrations are as the squares (see Cor. 4.), and the *lateral* as the *cubes* of those apertures. The utility of these proportions will more fully appear in the sequel.

We proceed now to the most important part of our article, *viz.* to shew what means have been not only devised, but practically applied, for remedying the defects arising out of these two different kinds of aberrations, and for rendering the apparent object, as viewed through a refracting telescope, at the same time distinct and colourless. Telescopes of what are called the *achromatic*, (from  $\alpha$ , priv., and  $\chi\rho\omega\mu\alpha$ , colour,) or colourless kind, are composed, like other telescopes, of two parts requiring separate consideration; *viz.* the object-glasses and the eye-tube: the former being that which produces an *image* free from colours and mistiness; and the latter that which either renders this image visible, or produces a secondary one to be viewed, without the reproduction of colours. But our present consideration is that of the object-glasses.

Before the working optician can proceed to prepare his tools for making an achromatic object-glass, he must know the refractive and dispersive powers of his glass. Various methods have been proposed for determining these qualities with accuracy; but it will be sufficient for our purpose to explain those which have been found most practicable. As the ratio between the sine of incidence and the sine of refraction is constant in the same glass, though not the same ratio in different sorts of glass, the most certain method of determining this ratio in different specimens of glass is, to grind a piece of each of those specimens by the same tool, as Martin and Tulley have done, and then to compare their refracted solar foci with the radius of curvature; and those which have the shortest refracted foci, will have the greatest refractive power; and the contrary. We have already explained, in the first section of our article, how this operation was conducted by Tulley in particular; and we will now state the results of his experiments in the subjoined little table.

Results of practical Experiments on the refractive Powers of different Specimens of Glass, by C. Tulley.

Kinds of Glass.	R Radius of Tool.	F Focus of re- fracted Rays.	$\frac{R}{F} = 2a$ a Divisor.	Ratio of the Sines of I and R.	Specific Gravity.	Ratio of dispersive Powers.	Kinds of Glass used together.
Flint 1. -	33.7	28.13	1.198	1.599 : 1	3.466	1.757 : 1	used with crown.
Flint 2. -	33.7	29.38	1.147	1.5735 : 1	3.192	1.524 : 1	used with crown.
Ratchiffe crown	33.7	31.91	1.056	1.528 : 1	2.527	1 : 1.757 1 : 1.524	used with flint 1. used with flint 2.
Dutch -	33.7	32.12	1.049	1.524 : 1	2.519	not known.	
Plate 1. -	33.7	33.43	1.008	1.504 : 1	2.450	1 : 1.65 1 : 1.623	used with flint 1. used with flint 2.
Plate 2. -	33.7	33.56	1.004	1.502 : 1	2.428	1.195 1.167	used with flint 1. used with flint 2.

If we explain how the numbers in the horizontal column of flint 1. were obtained, the rest of the table will require no further explanation. The tool on which the six specimens of glass were ground at the same time, was of speculum metal, and did not vary its shape much during the operation

of grinding and partial polishing, which was all that the glasses required for viewing the sun, and for adjustment to the solar focus. The first flint-glass, after being thus formed to a curvature on both sides of 33.7 inches radius, equal to that of the tool, was put into a tube and made into a temporary

porary telescope, when the principal or solar focus, from actual refraction of the rays, was found to be 28.13 inches, which is therefore called the *refracted* solar focus, the geometrical focus derived from the radius of curvature being 33.7. This is the specimen of glass of the greatest density as well as of the greatest refractive and dispersive powers, its specific gravity having been repeatedly ascertained to be 3.466 with different hydrostatic balances of the most delicate construction. Now if the radiant had been at a near distance, instead of the sun being used, Martin has shewn

that the value of  $a = \frac{m-n}{n}$  may be had from this theorem,

viz.  $\frac{dr + rf}{2df} = a$  (where  $d$ ,  $r$ , and  $f$ , are as in our Table I.

of Theorems), which is demonstrated in his *Philosophia Britannica*; and from this theorem he determined the focal distances and quantity  $a$  of his specimens of glass; but when the sun is used as the radiant, the distance becomes *infinite*; and then, neglecting  $rf$  as infinitely small, the left-hand term

becomes  $\frac{dr}{2df}$ , and the theorem, by ejecting  $d$  from the

numerator and denominator, is reduced into the form  $\frac{r}{2a} = f$ ,

as in our Table I. for parallel rays with a double convex of equal radii. Tulley, therefore, very properly preferred taking the solar focus at once, instead of taking a measured distance for the place of the radiant, and of calculating from a long theorem, and from data that might not be perfectly correct; his results, therefore, must be considered as being more satisfactory than Martin's. The reduced theorem

$\frac{r}{2a} = f$ , by transposition becomes  $\frac{r}{f} = 2a$ , and also  $f \times$

$2a = r$ ; hence  $2a$  may be either a divisor or multiplier, accordingly as  $r$  or  $f$  is given to find the other. Tulley has called this quantity a *divisor*, because, having the radius or geometrical focus of a glass always, from the known radius of his grinding tool, he can get the *refracted* focus by the proper divisor and a simple calculation at any time; which mode, as we shall see presently, is very useful in the calculation of the compound focus of an achromatic object-glasses. Now to get the actual quantity of  $2a$  in figures, there will

be  $\frac{33.7}{28.13}$  taken from the third and fourth vertical columns,

which may be called  $\frac{R}{F}$  or  $\frac{r}{f} = 2a = 1.198$  for the said

divisor, one half of which is  $.599 = a$ . Put now  $m$ , as before, for the sine of incidence, and  $n$  for the sine of refraction, and we have seen above that  $\frac{m-n}{n} = a$ . Let

$n = 1$ , and then  $m = 1.599$ ; for  $\frac{m-1}{1} = a \therefore m = 1 + a$

$= 1.599$ , and  $\frac{1.599-1}{1} = .599 = a$ ; therefore the sine

of incidence is to the sine of refraction in this first specimen, in the ratio of  $1.599 : 1$ ; and in like manner the horizontal columns for all the other specimens are filled up with very

little trouble, when  $\frac{R}{F}$  is ascertained by simple division of

the tabular or experimental numbers.—With respect to the

vertical column of dispersive powers, these powers are best ascertained by making six equal prisms of the same specimens of glass, and by measuring the coloured solar spectra of each separately, under exactly the same circumstances of distance, inclination, position, &c.; and as the angle of dispersion is measured by the coloured spectrum as its subtense, the angles of dispersion of the different specimens will vary with the respective lengths of their spectra; and if the refracting angle of one of the specimens, the first flint for instance, be diminished by grinding and fresh polishing, until its spectrum is of precisely the same length as that of any other, say the crown, then the ratio of their refracting angles will be inversely the ratio of their dispersive powers; and a pair of analogous lenses, one convex and the other concave, (such as those seen in *Plate XXVIII. figs. 5. and 6.*) will have their dispersive powers so counteracted, that a pencil of rays incident on the thick crown-glass will emerge from the thin flint *colourless*, and will proceed without colour, notwithstanding the greater refractive power of the convex lens, till, by being refracted, they finally cross the axis in which the focus is formed; and the focal point will be more or less distant with a pair of lenses so combined, accordingly as the difference of the two refracting powers is greater or smaller. To explain this analogy between a pair of prisms and a lens, either convex or concave, we will shew how a pencil of solar rays passing through a prism of glass is dispersed at the second surface, so as to form the solar spectrum composed of the prismatic colours: Let  $abc$ , in *fig. 9*, be a triangular piece of glass, called a prism, and  $d$  a pencil of solar light, entering the prism at  $e$ , in the line  $deB$ , parallel to the base  $ac$ : on entering the glass it will be refracted towards this base, and emerge at the point  $f$ , a little nearer to  $c$  than  $e$  is to  $a$ . At this point of emergence,  $f$ , the pencil will begin to *disperse* into rays of different colours, but whether into seven or any other number, is not our present object to enquire. Let  $AB$  be a screen, receiving the dispersed pencil in a darkened room, and  $fg$  will be the ray of mean refraction,  $fb$  will be the red ray, or ray of least refraction, and  $fi$  will be the violet ray, or ray of greatest refraction,  $hi$  being the length of the coloured spectrum. Let this prism be of crown-glass; then substitute another of flint-glass, exactly in the same situation, and the extreme rays,  $b$  and  $i$ , will now be dispersed to  $H$  and  $I$ , and the distance between those new points will be the length of the spectrum with flint-glass. Now the angle  $gfb$  with both prisms is called the angle of *deviation*, or of mean refraction; the angle  $ifb$  is called the angle of *dispersion* with the crown, and  $I f H$  the same with the flint prism; but these angles of dispersion are subtended by the lines  $ib$  and  $I H$  respectively, which are the lengths of their respective spectra, which therefore are the *measures* of the angles of *dispersion* of the two different prisms. Martin found these exactly as  $3 : 5$ , and therefore recommended the geometrical foci of the crown and flint glasses to be *always* in this proportion; but Tulley has found that this ratio will not be accurate with all specimens of flint-glass, and therefore takes a different ratio, for each specimen of glass that differs in this quality, from Martin's. In the same specimen of glass, the angle of *deviation* always bears the same proportion to the angle of *dispersion*, or *dissipation* as it is sometimes called; and it was the opinion of sir Isaac Newton that this is the case in *all specimens*; but it remained for the senior Dollond to discover, which is the basis of all achromatic constructions of an object-glass, that *the angles of deviation may be the same, when the angles of dispersion are not the same, and vice versa*; and we have a striking instance in crown and flint glass, in which, when the dispersive powers

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powers are made to balance each other in opposite directions, there yet remains a balance of refractive power in favour of the crown, arising from its greater thickness, which disposes colourless rays still to deviate or be refracted, but to a more distant focus than would have been if the crown had been used alone. This effect may be seen in *fig. 10*, where a pair of prisms, *a* and *b*, are inscribed in the double convex lens of crown-glass, and the pair *c* and *c* within the double concave of flint: the incident rays *de* and *de*, at each side of the axis *go*, enter the convex at the points *e* and *e*, and are refracted towards the axis, till they meet with the inverted prisms *c* and *c* of flint, when they are refracted in a contrary direction, so as to prevent their meeting at the point *o* of the axis to which they tended, and emerge at the points *f* and *f* colourless, in consequence of the opposite dispersions which take place in the prisms; but after emergence they tend to a new and more distant point *O* in the axis, and there come to an achromatic focus.

To render this explanation still more intelligible with respect to the *opposition* of two counteracting dispersions, let there be two separate prisms, placed, as in *fig. 11*, at a distance from each other, and inverted with respect to each other; let *abc* be the prism of crown-glass, and *ABC* a similar one of flint-glass; and let two pencils of white light enter these lenses in opposite directions, one *d*, and the other *D*; then *g* and *G* will be the rays of mean refraction, *h* and *H* those of least, or red; and *i* and *I* those of most, or violet. Now as the refractive power of the flint prism *ABC* is greater than that of the crown *abc*, the mean ray *G* in the first will be nearer its prism, than *g*, the mean ray of the second, to its prism; but the angle of dispersion subtended by *H I*, will be greater than that subtended by *h i*, while the prisms have the same refracting angles *C* and *c*. Now as the refraction and dispersion in the same prism are proportionate to the refracting angle, these may be both reduced to any assignable quantity by a reduction of the refracting angle; then let the side of the prism of flint *CA* be ground down till it becomes *CK*, thereby making the angle *BCA*, the original refracting angle, equal *BCK*, the new refracting angle; and let this second angle be to the first as the refractive power of the crown is to the refractive power of the flint; or, in other words, let the refracting angles *C* and *c* be inversely as the refractive powers of the two specimens of glass formed into prisms; *viz.* as that of *g f F*: *G F f*; and then the mean ray *G* will be extended to *c*, and *F c* will be parallel to *f C*; that is, the mean refraction of the two lenses will be alike, the angle *G F f* =  $\angle g f F$ , by being alternate. In this situation of the refracting angles of the opposite prisms, the rays would both enter and emerge parallel as to *refraction*; but as to *dispersion*, that of the flint would still predominate a little, or the angle *H F I* would in some measure exceed the angle *h f i*: but these are the angles we want to have equal; therefore, to make the refracting angles *C* and *c* of the two prisms proportional to the *dispersive* powers, or to the spectra *h i* and *H I* in *fig. 9*, let the side *BC* also of the flint prism be ground down a little to *l*, so that the refracting angle *l C k* of this flint, shall be to the refracting angle *a c b* of the crown in this ratio of the spectra; and then not only will the dispersive powers of the two prisms become equal, but, what is equally necessary, *G* will now fall beyond *c*; that is, the refractive power of the flint by this second diminution of its refracting angle, will become less than the refractive power of the crown, and the difference of these powers will refract the transmitted rays, as in *fig. 10*, finally to the distant point *O*, as has been explained, while at the same time the rays that arrive there will be without colours. If now we conceive that the re-

fracting angle of each of the flint prisms *c* and *c*, in *fig. 10*, inscribed within the concave lens *c c*, is so proportioned to the refracting angle of the prisms *a* and *b*, inscribed in the convex lens of crown *a b*, as the refracting angle *l C k* of the flint prism in *fig. 11*, is to the refracting angle *a c b* of the crown prism, then the double object-glasses in *fig. 10*, will be achromatic; its lenses being analogous to the correcting prisms. Thus the theory of a double achromatic object-glass is within the comprehension of our ordinary readers; and as the triple object-glass has two thin convex lenses of crown, instead of one thick, to combine with the flint concave one, a farther explanation is unnecessary, particularly if the thick double convex be supposed to be divided longitudinally into two plano-convexes, and to be placed one on each side of the concave: for when these plano-convexes are formed into two curves, giving the same focal distance each as one of the plano-convexes, then the union of the three lenses will be that represented in *fig. 7*.

We may now proceed to exemplify this theory, arising out of Dollond's grand discovery; and to make the construction as familiar as possible, we will avoid all fluxional calculations, and explain such algebraical ones only, as are indispensable, in the first example at full length, as they occur, so that the abridgments in the subsequent examples may be clearly intelligible. Our aim differs from that of our predecessors in this respect. The illustrious mathematicians Euler, d'Alembert, Clairaut, Boscovich, Klugel, and Robison, have given formulæ for the calculation of achromatic object-glasses, that are above the comprehension of ordinary opticians; and Dr. Brewster has calculated tables, according to these formulæ, of the different curves that suit a *certain specimen* only of flint-glass, and that such as is not to be found, at least in England; *viz.* that which has its sines of the  $\angle$  of incidence and of the  $\angle$  of refraction as 1.604 : 1. Besides, the calculations tabulated are not in a practical form in Table II., the radius of the convex being shorter than that of its contiguous concave. On the contrary, we propose to take glass that falls in our way, and to calculate in a familiar manner the radii of curvature that shall suit specimens already within our reach. In short, our predecessors shew how achromatic object-glasses *may be made*, if *proper glass could be obtained*; and we will explain how achromatic object-glasses *are made*, and in the *best* manner, with glass of our own manufacture.

*Example 1.*—Let it be required to form a double object-glass of thirty inches focal length, from the second flint-glass and crown-glass given in Tulley's table of experimental results? In the crown-glass, the ratio of the sines of the angles of incidence and of refraction (*m* : *n*) is 1.528 : 1; and in the flint-glass it is 1.5735 : 1; while the ratio of their dispersive powers are .500 : .762, or 1 : 1.524. The first step is to determine the ratio of the geometrical focus of the first or crown-glass, to the compound focus of the proposed pair of glasses, in order that the radii of this lens may be known, before its proper companion, the flint lens, have its focus determined. It will be convenient to call the radius of the convex 1, and as it is proposed to have it a double convex, the geometrical focus will also be 1; but as the compound focus of both lenses is the *refracted* focus always, the geometrical focus 1 must be turned into the refracted focus also, in order to have both of the same denomination: but to do this we want the divisor, which may be taken from the table, or derived from

$$\frac{m - n}{n} \times 2; \text{ thus } \frac{1.528 - 1.000}{1.000} = .528 \times 2 = 1.056, \text{ the}$$

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divisor of the crown; and  $\frac{1.5735 - 1.000}{1.000} = .5735 \times 2 = 1.147$ , the divisor of the flint. In the next place we have  $\frac{1.000}{1.055} = .94697$  for the refracted focus of the crown lens;

and because the foci of the crown and flint lenses must be in the same ratio as their dispersive powers, which we have

stated to be 1 : 1.524, we shall have  $\frac{1.524}{1.147} = 1.3827$  for the

refracted focus of the concave or flint-glass. Now, having .94697 : 1.3827 as the ratio of the two separate refracted focal distances that shall banish all colours by their equal and opposite dispersive powers; we next find what will be the compound focus corresponding to these two when put in contact. Let F be the focus of the convex, and 'F that of the concave; and by our *practical* theorem 5. there

will be  $\frac{F \times 'F}{'F - F} =$  the compound focus, which in plain

numbers will stand thus;  $\frac{.94697 \times 1.3827}{1.3827 - .94697} = 3.29$ , the

proportional compound focus required. Now if the prismatic aberration were the only one necessary to be counteracted, we have already obtained numbers that would enable us to construct an *achromatic* or colourless compound object-glass; for

if we multiply F, 'F, and f alike by  $\frac{30}{3.29}$ , or 9.12, the

geometrical focus of the convex lens, we should have the absolute refracted focus of  $F = .94697 \times 9.12 = 8.636$ ; that of  $'F = 1.3827 \times 9.12 = 12.61$ ; and the compound focus  $= 3.29 \times 9.12 = 30$  very nearly; and it would be immaterial what the curves were, provided the refracted focal distances of F and 'F were as above stated: but as the tools for forming the curves respectively for the sides of these lenses, must have regard to the *radii* of curvature, it would be now necessary to use the *divisors* as *multipliers*, to convert the refracted into the geometrical foci, and then the business might be put in hand. On this supposition, of there being only one kind of aberration, the construction of a compound achromatic object-glass would be no difficult affair; for while the focal distances only are required to be to each other in a given ratio, the radii of curvature might be varied almost at pleasure, without affecting the focal distance. But there yet remains the spherical aberrations of the two separate lenses to oppose to each other in such proportion, that their tendency to produce *indistinctness* may be completely obviated. Before the time of sir Isaac Newton, this was the only kind of aberration that opticians thought they had to contend with; and though it is small in quantity, compared to the prismatic aberration, yet it is more difficult to conquer. It is, however, contrary to the opinion of that great philosopher and mathematician, in the power of the modern optician to cure this defect of spherical glasses, by means equally simple, when determined, as those by which the prismatic colours are made very nearly to vanish. As in the annihilation of the prismatic colours, the *ratio of the focal distances*, made directly as the ratio of the *dispersive powers*, is a cure for the first imperfection; so the *ratio of the radii*,  $r : R$ , of the two lenses, so calculated as to counteract each other's spherical aberrations, is the cure for the second imperfection; and this cure we have yet to apply,

without interfering with the remedy which we have just prescribed for the other. In order to mark the distinction that must be made in the symbols, as applied respectively to the convex and concave lenses, let it be understood, that the subjoined notation will be attended to in our investigation of the curves proper for our present purpose; *viz.*

Convex.	Concave.	
r	'r	means the radius of the first surface.
R	'R	means the radius of the second surface.
F	'F	means the focus from solar rays, or geometrical, if so expressed.
T	'T	the thickness of the lens.
A	'A	the spherical aberration.
m	'm	the sine of incidence.
n	'n	the sine of refraction.
o		the compound focus.

It may be also necessary to premise, that whatever ratio of the radii r and R be fixed upon for the convex lens, the ratio 'r : 'R of the concave may always be found by proper investigation such, that its aberration will counteract that of r : R; but the reverse is not true; the aberration of 'r : 'R may be too great for the aberration of any ratio r : R to equal; therefore the ratio r : R is first assumed, as is most convenient for the optician's tools already formed; and 'r : 'R must be so calculated, that its aberration shall be in due proportion for correcting the aberration of the assumed convex lens. We now have to do with the *geometrical* foci of both lenses, when their *radii* become the

subject of investigation; and we have seen that  $9.12 \left( \frac{30}{3.29} \right)$

is the geometrical focus of the convex lens, therefore  $1.524 \times 9.12 = 13.9$  is the geometrical focus of the concave, their ratio being still as their dispersive powers, very nearly. Let us now assume  $r = 7.5$ , or any other quantity at option, and see by the proper theorem what R will be, to have a focus of 9.12 inches: to do this we have, by

No. 1. of our *practical theorems*, before given,  $\frac{r F}{2r - F} = R$ ,

or, in figures,  $\frac{7.5 \times 9.12}{2 \times 7.5 - 9.12} = R = 11.63$ ; hence

$r : R :: 7.5 : 11.63$ , or as 1 : 1.55. In the next place, we must determine what is the longitudinal aberration arising from the figure of a lens, where the ratio  $r : R$  is 1 : 1.55, which is most conveniently done by the general theorem of Huygens, which we have before exemplified, and which

stands thus;  $\frac{27r + 6rR + 7R}{6 \times r + R} \times T = A = 1.3614 \times T$ .

*viz.*  $\frac{27r^2 = 27.0}{+ 6rR = 9.3}{+ 7R^2 = 16.8175} \left\{ \begin{array}{l} r + R)^2 = (1 + 1.55)^2 = 6.5025 \\ \text{multiplied by } 6 \\ \text{value of num-} \\ \text{erator } \} = 53.1175 \end{array} \right. \left\{ \begin{array}{l} \text{value of deno-} \\ \text{minator } - \} = 39.015$

Then  $\frac{53.1175}{39.015} = 1.3614 \times T = A$ .

Having now found  $1.361 \times T = A$  of the convex lens, the value of T, which is the sum of the versed sines of the two intersecting curves of its surfaces, may be calculated by the square root, or by plane trigonometry, and will be found = .252, when the semi-diameter of the lens is 1.5, consequently  $1.361 \times .252 = .3429$ , is the absolute quantity of the spherical aberration of the convex lens; but 'T of the concave

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concave is by calculation .1653, and  $\frac{.3429}{.1653} = 2.074$  is its

proportional aberration. But as the thickness, breadth, and geometrical focal length of every lens, of whatever form, must, from the properties of the circle, be in proportion to each other (see Martin's New System, art. 705.), 'F may be taken at once, instead of using T and 'T with their calculated values (which require some operations), and then the work will be greatly facilitated; thus  $1.361 \times T \times 1.524 = 2.074 \times 'T = 'A$ . Now, as this quantity 2.074 bears the same proportion to 1.361, as the focus of the concave does to the focus of the convex, it might be concluded that this would be the proper aberration to correct the aberration 1.361 of the convex lens; but this is not the case, for, first, the longitudinal aberrations arising from the figure are not in the *simple* proportion to the foci of the lenses respectively, neither is the *quantity* the same with the flint as with the crown glass. Martin asserts that the spherical longitudinal aberrations are to each other, in like lenses of different focal lengths, *inversely* as the *squares* of the foci respectively; consequently, in our example, these aberrations would be inversely as  $F^2 : 'F^2$ ; or as  $13.9 \times 13.9 : 9.12 \times 9.12$ ;

that is, as 193.21 : 83.174, or as  $\left\{ \begin{array}{l} A \\ 1.361 \end{array} : \begin{array}{l} 'A \\ 0.585 \end{array} \right\}$ ; but

when Tulley took 0.585 = 'A, this aberration was found much too little; for when he had ground the lenses with curves to produce this aberration, he found that the eye-tube required to be drawn outwards more than inwards by the screw, from the true focal point, before the image disappeared, which is a proof that the concave had less than its share of aberration; it being considered as a test of good correction, when the image disappears at points of the tube equally distant from the point of distinct vision, accordingly as the tube is pushed in or drawn out from its focal point. And here was probably the difficulty that Martin experienced between his theory and practice. Neither was the aberration thus obtained in due proportion, when corrected by the simple ratio of the two divisors  $2a : 2'a$ , or 1.056 : 1.147, for the difference of the refractive powers; for as 1.147 : 1.056 :: 1.161 : 1.253; but  $1.253 \times 'T = 'A$  was still too little for due correction. Though the telescope was achromatic by virtue of the ratio of the foci of the crown and flint lenses, yet there was a want of perfect *diffinitions*, owing to the deficiency of aberration attaching to the concave lens. After a multiplicity of investigations, calculations, and practical trials, Tulley at length discovered a method of balancing the opposite aberrations, which he has continued to practise with success for years, and which is therefore no new project. The method is this: the value of 'A ( $2.074 \times 'T$ ) being first determined from A, in the ratio of F : 'F, as above explained, the *correcting number* is thus obtained; if we call the square root of the cube of the refracted focus of the convex = x, the geometrical focus being taken = 1; and put also y for the square root of the cube of the refracted focus of the concave, when its geometrical focus is = 1; then  $\frac{y}{x} = z$  is the correcting number,

by which the proportional aberration, before determined, must be *divided*, to gain the proper or *corrected* aberration,

now expressed by the symbols  $\frac{'A}{z}$ . In the instance before us, the calculation will be  $.947^3 = .8492781$ , and its square root = .2914 = x; and  $\sqrt{.872^3} = .2575 = y$ ; then

$$\frac{.2575}{.2914} = .883 = z, \text{ the correcting divisor, and also } \frac{'A}{z} =$$

$$\frac{2.074}{.883} = 2.348 = 'A \text{ corrected.}$$

Having now ascertained the aberration  $2.348 \times 'T$  of the concave lens, that will balance the aberration  $1.361 \times T$  of the convex, we must proceed to determine the ratio 'r : 'R of the concave, that shall have exactly this aberration: to be able to do this without a table of aberration, requires an acquaintance with quadratic equations; for the proportion of the radii 'r and 'R must be investigated from the corrected aberration which we have now ascertained.

1st. We have  $\frac{27r^2 + 6rR + 7R^2}{6 \times r + R^2} \times T = A$  (by

the general theorem) =  $2.348 \times 'T$ , as before found; but we make no distinction between r, R, T, A, and 'r, 'R, 'T, 'A, that we may simplify the symbols: this equation, by evolution of  $r + R^2$  in the denominator, becomes

$$\frac{27r^2 + 6rR + 7R^2}{r^2 + 2rR + R^2} \times \frac{T}{6} = 2.348 \times T: \text{ now by putting } R = 1, \text{ there will be } \frac{27r^2 + 6r + 7}{r + 2r + 1} \times \frac{T}{6} = 2.348$$

$$\times T; \text{ or, dividing both sides by } \frac{T}{6}, 6 \times 2.348 = 14.088,$$

$$\text{or } 14.1 = \frac{27r^2 + 6r + 7}{r^2 + 2r + 1}; \text{ and multiplying both by the}$$

denominator,  $14.1r^2 + 28.2r + 14.1 = 27r^2 + 6r + 7$ : then subtracting equal quantities from both, there remains  $22.2r + 7.1 = 12.9r^2$ ; and by transposition,  $12.9r^2 - 22.2r = 7.1$  for the *quadratic*. Now to find the *root*, we have first

$$r^2 - \frac{22.2r}{12.9} = \frac{7.1}{12.9}; \text{ and adding the square of half the}$$

$$\text{co-efficient, } r^2 - \frac{22.2}{12.9}r + \frac{11.1^2}{12.9} = \frac{7.1}{12.9} + \frac{11.1^2}{12.9}; \text{ therefore}$$

$$\text{the root } r = \frac{11.1}{12.9} = \sqrt{\frac{7.1}{12.9} + \frac{11.1^2}{12.9}}, \text{ and } r =$$

$$\sqrt{\frac{7.1}{12.9} + \frac{11.1^2}{12.9}} + \frac{11.1}{12.9}.$$

Lastly; to collect the aggregate of the values of r, we

$$\text{have } \frac{7.1}{12.9} = .55, \frac{11.1^2}{12.9} = .74, \text{ and } \sqrt{.55 + .74} =$$

$$\sqrt{1.29} = 1.135; \text{ likewise } \frac{11.1}{12.9} = .860; \text{ therefore } 1.135$$

+ .860 = 1.995 = r, which was desired; and the ratio r : R, which we now put again 'r : 'R = 1.995 : 1; and which in Tulley's Table stands 2 : 1. After having thus determined the ratio of the radii 'r and 'R to be 2 : 1 very nearly, we must now find the rational geometrical focal distance of this concave by the fourth of our *practical theorems*

above exemplified; viz. from  $\frac{2rR}{r + R}$ , we first have

$$\frac{2 \times 2 \times 1}{1 + 2} = 1.333; \text{ and as the geometrical focus is known}$$

$$\text{to be } 13.9, \text{ we have also } \frac{13.9}{1.333} = 10.428 = 'R, \text{ and } 10.428$$

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$\times 2 = 'r$ ; so that the four radii of the faces and the corresponding foci will stand thus; *viz.*

$r = 7.50$  } and  $F = 9.12$ , the geometrical focus of the  
 $R = 11.63$  } convex lens.

$'R = 10.428$  } and  $'F = 13.9$ , the geometrical focus of the  
 $'r = 20.856$  } concave lens.

$\Phi = 30.04$  the compound refracted focus of the telescope, according to the proper theorem.

We have now brought the calculations of our first example to a conclusion, accompanied by such explanations as may render it unnecessary to dwell so minutely on the following examples; and when we have gained these radii for a telescope of 30 inches focus, we have the means of making a telescope equally achromatic and distinct of any other length; for the ratios  $r : R$  and  $'r : 'R$ , being once determined for crown and flint glafs of given refractive and dispersive powers, require only to be increased in equal quantities to suit the foci of the proposed telescopes, as in the subjoined table; and it may be proper to notice, that though the specific gravity has not been taken into the account in the calculations of this example, yet it is useful as an index to point out the ratio of the sines of incidence and of refraction, and of the dispersive powers to be used, when the specimens of glafs are selected by their specific gravities only, without an experimental trial by grinding.

The subjoined table is suitable for achromatic double object-glasses of various lengths; where  $m : n$  in the crown-glass is as 1.528 : 1, and in the flint as 1.5735 : 1; their dispersive powers being 1 : 1.524.

TABLE I.—Radii of double Object-glasses in Inches.

$\Phi$	$r$	$R$	$'R$	$'r$
6	1.50	2.326	2.086	4.171
12	3.00	4.652	4.171	8.342
18	4.50	6.978	6.256	12.513
24	6.00	9.304	8.342	16.684
30	7.50	11.630	10.428	20.856
36	9.00	13.956	12.512	25.027
42	10.50	16.282	14.598	29.198
48	12.00	18.608	16.684	33.369
54	13.50	20.934	18.770	37.540
60	15.00	23.260	20.856	41.712
72	18.00	27.912	25.025	50.054
84	21.00	32.564	29.196	58.396
96	24.00	37.216	33.368	66.738
108	27.00	41.868	37.540	75.080
120	30.00	46.52	41.712	83.424

In this table,  $R$  and  $'R$  are the faces of the two lenses which come in contact, and  $r$  and  $'r$  the external faces; and it will be seen that  $R$ , being a little longer than  $'R$ , the convex face, will approach the concave one very closely, but will not touch it, which is a necessary practical condition. When the aberration exceeds 1.666, which is that of  $r : R$  when they are each = 1, or alike; then  $r$  exceeds  $R$ , and the lens must be reversed, or put in its worst position: which is the case in all our tables for double object-glasses with the flint-glass; otherwise the concave would not have had sufficient aberration for the convex.

In our next example it will not be necessary to do the work at full length, but only to give such an abridgment as will be intelligible to the reader who understands the process minutely explained in the preceding example. The density of different sorts of crown-glass seldom varies; but two specimens of flint can seldom be found to be alike. The greater the density of flint-glass, the more suitable it is for the purpose of making a concave lens of an achromatic object-glass, because the radii of both the lenses may be longer for the same compound refracted focus; and, consequently, the spherical aberration will be less than in glass that requires shorter radii to produce the same compound focus. If the form of the concave had been given, the convex would have been determined by a reversed operation, where the multiplier 1.524 would have been a divisor, and  $z$  a multiplier, &c.

*Example 2.*—Let it be required to form a double object-glass of 30 inches focal length, as before, with the same crown-glass for the convex, but with the densest flint, in which the ratio  $m : n$  is as 1.599 : 1, and their dispersive powers 1 : 1.757?

In this example we have  $1.056 = 2a$ , or the divisor for the crown, as before, and  $1.599 - 1 \times 2 = 1.198 = 2a$ , or divisor for the flint; then  $\frac{1}{1.056} = .94697 = F$  refracted, and

$\frac{1.757}{1.198} = 1.466 = 'F$ , also refracted; and also  $\frac{F \times 'F}{'F - F} =$

2.67, the ratio of the compound focal length, or what we called the *rational* compound focus; consequently, the ratio between  $F$  geometrical and the compound focus is in this example 1 : 2.67; and the ratio between the refracted foci of the separate lenses, to correct the colorific

rays, is  $\left\{ \frac{F}{.94697} : \frac{'F}{1.466} \right\}$ . With respect to the spherical

aberrations, which are next to be considered, we may in the first place determine the quantities  $x$  and  $y$ , and  $z$  the *correcting* divisor, which is derived from them, thus;

$\left\{ \sqrt[3]{.94697^3} = .2914 = x \right\}$ ; and as  $\frac{1}{1.198} = .834$ , &c.

gives the refracted focus of the flint or concave lens, ( $F$  geometrical being = 1 in this case,)  $\sqrt[3]{.834^3} = .2408 = y$ , and

$\frac{y}{x} = \frac{.2408}{.2914} = z = .826$ , the *correcting* divisor required for

this refractive power of the flint-glass. In the next place,

$\frac{30}{2.67} = 11.23 = F$  (geometrical), and  $11.23 \times 1.757 =$

19.73 =  $'F$  (geometrical also). Let us here assume  $r = 9$

inches, and then by the theorem  $\frac{rF}{2r - F} = R$ , we get

$R = 14.92$ , and consequently the ratio  $r : R$  will be 9 : 14.92, or 1 : 1.66 in its lowest terms. A double convex

lens

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TABLE II.—Radii of double Object-glasses in Inches.

Φ	r	R	'R	'r
6	1.80	2.98	2.61	8.03
12	3.60	5.97	5.22	16.06
18	5.40	8.95	7.83	24.09
24	7.20	11.93	10.44	32.12
30	9.00	14.92	13.06	40.15
36	10.80	17.91	15.67	48.18
42	12.60	20.89	18.28	56.21
48	14.40	23.87	20.89	64.24
54	16.20	26.85	23.49	72.27
60	18.00	29.84	26.12	80.30
72	21.60	35.82	31.34	96.36
84	25.20	41.78	36.56	112.42
96	28.80	47.75	41.76	128.48
108	32.40	53.71	46.98	144.54
120	36.00	59.68	52.24	160.60

lens ground with its radii in this ratio, will have its spherical aberration =  $1.325 \times T$ ; to counteract which, the concave must have its proper aberration determined; and then the ratio of its radii must be investigated, that shall make a lens with this determined quantity of aberration. We have seen already that  $A = 1.325 \times T$ , therefore  $1.325 \times 1.757 = 2.328 \times T = 'A$ , the proportional aberration for 'F, considered as having the same refractive power as F; but the *correcting*

divisor must now be applied, and  $\frac{'A}{z} = \frac{2.328}{.826} = 2.818$

is the corrected aberration, for which the radii 'r and 'R are now to be investigated. By putting 'R = 1, as before, and by working out the root of the quadratic arising from  $\frac{27r^2 + 6rR + 7R^2}{6 \times r + R^2} \times T = 2.818$ , we shall have the

ratio 'R : 'r = 1 : 3.075. And, lastly, for the actual radii of the concave, we get, by our practical theorem  $\frac{2rR}{r+R} = F$ ,  $\frac{2 \times 1 \times 3.075}{1 + 3.075} = 1.51 = 'F$  rational, and  $\frac{19.73}{1.51} = 13.06 = 'R$ ; as also  $13.06 \times 3.075 = 40.15 = 'r$ , the second side of the concave. Whence we now have

$$\left. \begin{array}{l} r = 9.00 \\ R = 14.92 \end{array} \right\} \text{and } F = 11.23 \text{ geometrical.}$$

$$\left. \begin{array}{l} 'R = 13.06 \\ 'r = 40.15 \end{array} \right\} \text{and } 'F = 19.73 \text{ geometrical.}$$

Φ = 29.81 according to the proper theorem.

It may be satisfactory to prove, that the geometrical quantities F and 'F, which we have here determined, will make Φ, the compound focus of the telescope, = 30 inches. But it will be requisite first to turn the geometrical foci F and 'F into the refracted foci, by their respective divisors,

denominated 2a and 2'a, viz. 1.056 and 1.198: thus,  $\frac{11.23}{1.056}$

= 10.634 = F refracted, and  $\frac{19.73}{1.198} = 16.479 = 'F$  re-

fracted; then by our theorem  $\frac{F \times 'F}{'F - F} = \Phi$ , we have

$$\frac{10.634 \times 16.479}{16.479 - 10.634} = \frac{175.237686}{5.845} = 29.81 = \Phi; \text{ and if}$$

the decimal had been carried farther in the geometrical foci, the compound focus would have been quite 30, as required. It may be for the benefit of practical men to subjoin a table similar to our preceding one, derived from the radii of curvature determined in this second example. And let it be understood by our readers, that in all our tables for the radii of curvature, the length of the telescope in inches is denoted by the figures in the first vertical column; and that the numbers in the same horizontal column with any given length, shew the proper geometrical radii of curvature for convex and concave lenses to construct such telescope.

The following table is suitable for double achromatic object-glasses of various focal lengths, where m : n in the crown-glass is as 1.528 : 1, and in the flint as 1.599 : 1; and their dispersive powers as 1 : 1.757.

*Example 3.*—We shall now take the same crown-glass, with a flint-glass between the two extremes, which we have used, viz. in which m : n is as 1.584 : 1, and their dispersive powers as 1 : 1.59; and let it be required to calculate a double achromatic object-glass of 30 inches focal length, as before?

Having already the divisor (2a) of the crown equal 1.056, we begin with getting that of the flint thus,  $\frac{1.584 - 1 \times 2}{1.168} = 2'a$ , or proper divisor; then

$\frac{1}{1.056} = .94697 = F$  refracted, as before; and  $\frac{1.59}{1.168}$

= 1.3613 = 'F refracted. Also  $\frac{F \times 'F}{'F - F} = 3.111$ , the

rational compound focus; and 1 : 3.111 is the ratio between F geometrical and Φ. We have x = .2914 from our former

examples, and to get y, we have  $\frac{1}{1.168} = .856 = 'F$  re-

fracted, when 'F geometrical is = 1; therefore  $\sqrt{.856^3}$

= .2512 = y; but  $\frac{y}{x} = z$ ; hence  $\frac{.2512}{.2914} = .862 = z$ ,

the correcting divisor. Again,  $\frac{30}{3.111} = 9.643 = F$  geo-

metrical, and  $9.64 \times 1.59 = 15.327 = 'F$  in the same denomination. In this example we will take r = 8 inches;

then, by the proper theorem  $\frac{rF}{2r - F} = R$ , we have

$$\frac{8 \times 9.64}{2 \times 8 - 9.64} = 12.12 = 'F, \text{ and } \frac{12.12}{9.64} = 1.515; \text{ con-}$$

sequently the geometrical ratio r : R = 1 : 1.515. Also, from

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from the general theorem of Huygens, we find  $A = 1.374 \times T$ , and  $1.374 \times 1.59 = 2.184 \times 'T = 'A$  rational, which is yet to be corrected; then  $\frac{2.184}{.862} = \frac{'A}{z} = 2.535$ , the corrected aberration. By getting the root of the quadratic arising from this aberration agreeably to the general theorem, as before, the ratio of the radii  $'R : r$  comes out  $1 : 2.375$ .

Lastly, by the theorem  $\frac{2rR}{r+R}$  we get  $\frac{2 \times 1 \times 2.375}{1 \times 2.375} = 1.407 = 'F$  rational, and  $\frac{15.327}{1.407} = 10.89 = 'R$ , and also  $10.89 \times 2.375 = 25.864 = 'r$ . We have, therefore,

$$\left. \begin{array}{l} r = 8.00 \\ R = 12.12 \end{array} \right\} \text{and } F = 9.643.$$

$$\left. \begin{array}{l} 'R = 10.89 \\ 'r = 25.86 \end{array} \right\} \text{and } 'F = 15.327.$$

Hence the next table is suitable for double, achromatic object-glasses of various focal lengths, where  $m : n$  in the crown-glass is as  $1.528 : 1$ , and in the flint as  $1.584 : 1$ ; and their respective disperse powers as  $1 : 1.590$ .

TABLE III.—Radii of double Object-glasses in Inches.

$\phi$	$r$	$R$	$'R$	$'r$
6	1.60	2.42	2.18	5.17
12	3.20	4.84	4.36	10.34
18	4.80	7.27	6.53	15.52
24	6.40	9.69	8.71	20.69
30	8.00	12.12	10.89	25.86
36	9.60	14.54	13.06	31.03
42	11.20	16.97	15.24	36.20
48	12.80	19.38	17.42	41.38
54	14.40	21.81	19.60	46.55
60	16.00	24.24	21.78	51.72
72	19.20	29.08	26.14	62.06
84	22.40	33.93	30.49	72.40
96	25.60	38.77	34.85	82.75
108	28.80	43.63	39.20	93.10
120	32.00	48.48	43.56	103.44

*Example 4.*—Let us next take an example, in which plate-glass is substituted for crown, and let the sines of the angles of incidence and of refraction in it be as  $1.504 : 1$ , while  $m : n$  in the flint is as  $1.573 : 1$ , and their disperse powers  $1 : 1.623$ ; and let the length of the telescope be required to be 30 inches, as before? Then  $\frac{m-n}{n} \times 2 = 2a = 1.008$ , is the divisor for the plate-glass; and

$\frac{m-n}{n} \times 2 = 2a = 1.147$ , or a divisor for the flint; also  $\frac{1}{1.088} = .992 = F$  refracted; and  $\frac{1.623}{1.147} = 1.415 = 'F$

refracted. Again,  $\frac{F \times 'F}{'F - F} = 3.318 = \phi$  rational; also

$\sqrt{.992^3} = x = .3124$ , and  $\left(\frac{1}{1.147} = .872\right) \sqrt{.872^3}$

$= y = .2575$ ; whence  $\frac{y}{x} = \frac{.2575}{.3124} = .824 = z$ . Like-

wise  $\frac{30}{3.318} = 9.03 = F$ , and  $9.03 \times 1.623 = 14.65 = 'F$ .

Put  $r = 7.5$ ; then  $\frac{rF}{2r - F} = R = 11.34$ , and  $\frac{R}{r}$

$= 1.51$ , or  $r : R :: 1 : 1.51$ ; hence  $A$ , by the general theorem of Huygens,  $= 1.376 \times T$ , and  $'A = 1.376 \times 1.623 = 2.233 \times 'T =$  the aberration of the concave corrected for the difference of refractive power. The root arising from a quadratic equation of this aberration is  $'r = 2.78$ , whic

$'R = 1$ , consequently  $\frac{2rR}{r+R} = 1.471 = 'F$  rational, and

$\frac{14.65}{1.471} = 9.96 = 'F$  geometrical; also  $9.96 \times 2.78 =$

$27.68 = 'F$  geometrical. Thus,

$$\left. \begin{array}{l} r = 7.50 \\ R = 11.34 \end{array} \right\} F = 9.03 \text{ geometrical.}$$

$$\left. \begin{array}{l} 'R = 9.96 \\ 'r = 27.68 \end{array} \right\} 'F = 14.65 \text{ geometrical.}$$

TABLE IV.—Radii of double Object-glasses, with Lenses of Plate and Flint, in Inches.

$\phi$	$r$	$R$	$'R$	$'r$
6	1.50	2.27	1.99	5.54
12	3.00	4.54	3.98	11.07
18	4.50	6.81	5.97	16.61
24	6.00	9.08	7.96	22.15
30	7.50	11.34	9.96	27.68
36	9.00	13.61	11.95	33.22
42	10.50	15.88	13.94	38.76
48	12.00	18.15	15.93	44.30
54	13.50	20.42	17.92	49.83
60	15.00	22.68	19.92	55.36
72	18.00	27.22	23.90	66.44
84	21.00	31.76	27.88	77.51
96	24.00	36.30	31.86	88.59
108	27.00	40.83	35.85	99.66
120	30.00	45.36	39.84	110.72

*Example*

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*Example 5.*—Let the ratio of the radii of the convex lens be 1 : 6, in which the spherical aberration is a *minimum*, and let the crown and flint glass be as in the first example for a telescope of 30 inches?

Then, by the same process, there will come out

$$\begin{aligned} r &= 5.32 \\ R &= 31.92 \end{aligned} \left. \vphantom{\begin{aligned} r &= 5.32 \\ R &= 31.92 \end{aligned}} \right\} F = 9.12, \text{ as before.}$$

$$\begin{aligned} 'R &= 12.60 \\ 'r &= 15.50 \end{aligned} \left. \vphantom{\begin{aligned} 'R &= 12.60 \\ 'r &= 15.50 \end{aligned}} \right\} 'F = 13.9, \text{ as before.}$$

This table is proper for glass of the same refractive and dispersive powers as in Table I., but with the spherical aberrations the least possible.

TABLE V.—Radii of double Object-glasses in Inches, where the Convex has a Minimum of Aberration.

$\Phi$	$r$	R	'R	'r
6	1.06	6.38	2.52	3.10
12	2.12	12.77	5.04	6.20
18	3.18	19.15	7.56	9.40
24	4.25	25.54	10.08	12.50
30	5.32	31.92	12.60	15.50
36	6.38	38.30	15.12	18.60
42	7.44	44.69	17.64	21.70
48	8.50	51.07	20.16	24.80
54	9.57	57.45	22.68	27.90
60	10.64	63.84	25.20	31.00
72	12.76	76.61	27.72	37.20
84	14.88	89.38	30.24	43.40
96	17.00	102.15	32.76	49.60
108	19.14	114.91	35.28	55.80
120	21.28	127.68	50.40	62.00

In the preceding example, where the ratio of the two radii of the convex lens were given,  $r$  comes out = 5.32 in a thirty-inch telescope; and in like manner, when the aberration only is given, the ratio of the radii may first be determined by a quadratic equation, and then the other curves may be determined as they have been here, without any assumption of  $r$  in the convex lens. But in all cases the relative refractive and dispersive powers must be known previously to the calculations such as we have exemplified.

*Example 6.*—In this example let us take the same crown and flint glass as we did in the second example, and put  $r = 7.5$ , as in our first example; and then the radii will be as in the following table.

TABLE VI.—Radii of double Object-glasses in Inches.

$\Phi$	$r$	R	'R	'r
6	1.50	4.47	2.91	6.12
12	3.00	8.94	5.82	12.24
18	4.50	13.41	8.73	18.35
24	6.00	17.88	11.64	24.47
30	7.50	22.34	14.56	30.58
36	9.00	26.81	17.47	36.70
42	10.50	31.28	20.38	42.82
48	12.00	35.75	23.29	48.94
54	13.50	40.22	26.20	55.05
60	15.00	44.68	29.12	61.16
72	18.00	53.62	34.94	73.40
84	21.00	62.56	40.76	85.64
96	24.00	71.50	46.58	97.88
108	27.00	80.44	52.41	110.12
120	30.00	89.37	58.23	122.32

*Example 7.*—Let us take in this example the crown and flint glass as in the first example, and put  $r = 9$ , as in our second example, and then the radii will come out as in the subjoined table.

TABLE VII.—Radii of double Object-glasses in Inches.

$\Phi$	$r$	R	'R	'r
6	1.80	1.85	1.83	5.86
12	3.60	3.70	3.66	11.72
18	5.40	5.54	5.48	17.58
24	7.20	7.39	7.31	23.44
30	9.00	9.24	9.13	29.30
36	10.80	11.09	10.96	35.16
42	12.60	12.94	12.78	41.02
48	14.40	14.78	14.61	46.88
54	16.20	16.63	16.43	52.74
60	18.00	18.48	18.26	58.60
72	21.60	22.18	21.92	70.32
84	25.20	25.88	25.57	82.04
96	28.80	29.57	29.23	93.76
108	32.40	33.27	32.87	105.48
120	36.00	36.96	36.52	117.20

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In this and the six preceding tables, the radii are calculated for an aperture of three inches for a focal distance of thirty inches; and the optician who may use any of them, with *similar glass*, may increase or diminish his aperture accordingly as the focal length is greater or less than thirty inches.

If we examine and compare the respective radii  $r$  and  $R$ , and also  $'r$  and  $'R$  of the convex and concave lenses in the preceding tables, which are all calculated by the same process that is used by Tulley, and several of which have been used in practice, we shall perceive that a difference in the quality of the glass, as to *dispersive* and *refractive* powers, makes the curves of the lenses widely different; and that a small alteration in the assumed value of  $r$ , the first face of the convex lens, also produces a great alteration in the curves of the three other faces of the compound object-glass. For instance, if we compare the radii in Table I. with those in Table VI., where  $r$  is assumed equal, *viz.* 7.5, in both, and where the same crown-glass is used, and the *flint-glass alone* taken different, the former being No. 2. and the latter No. 1; the radii in the former are  $r = 7.5$ ,  $R = 11.63$ ,  $'R = 10.43$ , and  $'r = 20.86$ , in a telescope of thirty inches focal length; whereas in Table VI. there is  $r = 7.5$ , as before, but  $R = 22.34$ ,  $'R = 14.56$ , and  $'r = 30.58$ ; which curves are very widely different. And if we compare Table II. with Table VII., in both which  $r$  is again assumed equal, as well as the crown, while the two flints are *reversed*, *viz.* the former having No. 1. and the latter No. 2, the comparison will stand thus in telescopes of thirty inches focal length: in Table II. there is  $r = 9.00$ ,  $R = 14.92$ ,  $'R = 13.06$ , and  $'r = 40.15$ ; but in Table VII.  $r = 9.00$ , as before, while  $R$  is  $= 9.24$ ,  $'R = 9.13$ , and  $'r = 29.30$ . Hence it is manifest, that it is not only *useless* but *detrimental* to copy the radii of a double object-glass of even the best telescope that ever was made by any artist, unless the *refractive* and *dispersive* powers of both sorts of glass be *precisely the same*, in the given and proposed telescopes intended to be equally good: but when different specimens of glass are necessarily used by different artists, it is hardly to be expected that both the requisite qualities of each piece of glass will be found alike, or even sufficiently near a perfect similarity, to authorise the copying of the radii of a standard telescope, even if those radii could be measured by mechanical means with sufficient accuracy; but the measurement from the *solar focus* of a lens, as is usual, does not afford data for obtaining the *geometrical focus*, and from it the radii of curvature, unless the quantity  $2a$  be previously known; though the converse operation, we have before seen, is not difficult to a practical optician. We have no hesitation, therefore, in condemning the practice of analysing a telescope for the purpose of copying it; for it is the certain guide to irrational constructions; and seldom will an instrument so made be free from either colours or indistinctness.

Neither is it safe to copy tables, such as those published by Dr. Brewster, in his edition of Fergufon's Lectures, of which the *forms* are also given under the article *ACHROMATIC Telescopes*, (in the Edinburgh Encyclopædia,) until the specimens of glass to be used are ascertained to have the same *refractive* and *dispersive* powers, as those from which the tables are calculated. On comparing these tables with the results of professor Robison's calculations, given in the Encyclopædia Britannica under the article TELESCOPE, we find not only that the basis of these tables is derived from this source, but that the calculations themselves are adopted, without further modification than what is necessary for adapting them to given focal lengths of the

compound object-glass. As professor Robison's article on our present subject has hitherto been considered to be the only article in our language that has disclosed the steps by which an *achromatic object-glass* may be constructed directly from mathematical calculations; it will be satisfactory to our readers that we should try what curves will result from Tulley's practical mode of proceeding, when the same data are taken that Robison has used in one of his examples. In an example worked according to Boscovich's formula, the ratio of  $m : n$  in the crown-glass is taken as 1.526 : 1, and in the flint, so high as 1.604 : 1; while the ratio of the dispersive powers, when converted into the proper terms, are

only in the ratio 1 : 1.65, or 1 :  $\frac{1}{.6054}$ ; let us see what

will be the curves of a thirty-inch telescope, when  $r$  is assumed = 9.7, and  $R = 9.54$ , according to Dr. Brewster's Table VI., derived from Robison's numbers  $0.32325 \times 30 = 9.6975$ , and  $0.31798 \times 30 = 9.5394$ .

As  $r$  is greater than  $R$  in this assumption, the convex lens is in its worst position, and the spherical aberration,  $A$ , determined by the general theorem of Huygens, will be  $1.682 \times T$ : and as the geometrical foci of the two lenses must be directly as their dispersive powers, and as  $T$  and  $'T$  are inversely as those foci, we shall have  $1.682 \times 1.65 = 2.775$  for the proportional aberration  $'A$  uncorrected; then as the correcting number, for flint of 1.599 : 1, which is the most dense that Tulley has met with, is .826, we may take this without apparent error for that of 1.604 : 1; and

then  $\frac{2.775}{.826} = 3.26 = 'A$  is the *corrected* aberration of the

concave; and according to this aberration, the root of the quadratic will give  $'R : 'r$  as 1 : 5.40; and by theorem  $\frac{2rR}{r+R}$

the rational focus will be  $\frac{2 \times 5.40 \times 1}{5.40 + 1} = 1.688$ ; then

having  $r = 9.7$ , and  $R = 9.54$ , by the same theorem we have  $F$  of the convex = 9.618, and  $F \times 1.65 = 15.8697 = 'F$ , or focus of the concave. Also we have

$\frac{15.87}{1.688} = 9.401 = 'R$ , or shorter radius of the concave;

and  $9.401 \times 5.4 = 50.76 = 'r$ , or longer radius of the concave. Lastly, to obtain the compound focus  $\Phi$ , we must reduce the geometrical focus of each lens into its refracted focus, by the proper divisors 1.052 for the crown, and 1.208

for the flint; then we shall have  $\frac{9.618}{1.052} = 9.14$  for the re-

fracted focus of the convex, and  $\frac{15.87}{1.208} = 13.04$  for the

refracted focus of the concave; and by the theorem  $\frac{F \times 'F}{F - 'F}$

these numbers will give  $\frac{9.14 \times 13.04}{13.04 - 9.14} = 30.53 = \Phi$ .

We have now obtained numbers that will enable us to form the desired comparison; thus, according to Robison,

$$r = 9.7, R = 9.54, 'R = 9.54, 'r = 47.47;$$

but according to Tulley,

$$r = 9.7, R = 9.54, 'R = 9.40, 'r = 50.7.$$

Also, according to Robison we have  $F = 9.618$  and  $'F = 13.25$  geometrical, and the compound focus  $\Phi = 29.1$ . But according to Tulley,  $F = 9.618$  and  $'F = 15.8697$  geometrical, while the compound focus  $\Phi = 30.53$ .

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Now as  $F : 'F :: 1 : 1.65$  (the respective disperse powers), let us see if either of these results will make an *achromatic* telescope: thus, as  $\left\{ \begin{array}{l} F \\ 1 : 1.65 :: 9.618 : 15.8697 \end{array} \right\}$

which shews that Tulley's foci are *exactly as the disperse powers*, and therefore would be *achromatic*, if the *disperse power* had been truly proportioned to the *refractive power*; but from long experience he knows, that the disperse power of flint-glass of the greatest density, compared with that of crown, which seldom varies, is not less than 1.759 : 1. Hence Robison's disperse power is in the first place taken too low; and in the next, allowing it to be truly taken, he has not preserved the two separate focal distances in such ratio, agreeably to that of the disperse powers, as will make an *achromatic telescope*. And this is further proved by the circumstance, that the compound focus does not come out exactly 30, which it will always do by Tulley's process, if the proportions are all *rational*. If we substitute the ratio 1.759 : 1, instead of 1.65 : 1, for the disperse power, which Tulley's table of disperse powers gives, to correspond with the refractive powers, when  $m : n$  as 1.599 : 1; and if we take the convex lens of Robison in the worst position, as before, with  $r = 9.7$ , and  $R = 9.54$ , the radii of the concave, by Tulley's mode of calculating, will be  $'R = 9.65$ , and  $'r = 68.04$ , and the compound focus  $\Phi = 25.6$ ; with which curves and focal length the telescope would be *achromatic*, and truly *corrected* for spherical aberration; but as  $R$  comes out a deeper curve than  $'R$ , these surfaces would come in contact at the centre, and therefore are not in a practicable form. Hence we infer that the construction of an achromatic telescope with Robison's convex lens in its *worst* position is impracticable, though a concave might be determined to suit it in its best position; *viz.* when its faces are reversed. There is, indeed, no form of a double convex lens, but a concave may be calculated to suit it, provided the curves come out in a practicable form; but, on the contrary, a concave may be fixed on that, in its worst position, (which is always its position in a double object-glass,) can have no convex that will match it. Martin has

shewn, that if the aberration of a given concave be  $\frac{a}{b} \times 'T$ ,

then  $\frac{a}{b} \times 'T \times \frac{6}{'T} = \frac{4a}{b} = 6.42857$  will be a *minimum*;

whence  $a : b :: 6.43 : 4 :: 16 : 10$  nearly. Therefore, when

$\frac{4a}{b}$  is *less* than 6.43, the problem will be impossible. For

instance, in a plano-concave lens, the aberration is  $\frac{1}{2}$  of  $T$ , and  $\frac{1}{2} \times 4 = 4.66$  only, which should not be less than 6.43; and therefore this lens cannot be used singly with a convex of any description; much less can a concave in its best form, where  $r : R :: 1 : 6$ , be used; for its aberration

$\frac{15}{14} \times T$  gives  $\frac{4a}{b} = 4.284$  only. But either of these may

be used in their worst position, because then either of them will have aberration enough for any convex. And this previous consideration will enable the skilful optician to fix on a proper ratio of  $'r : 'R$ , before he proceeds to his calculation. Should it be asked, why we prefer Tulley's disperse powers to professor Robison's? our answer is this; that Tulley's were not gained simply by prismatic measurement of the spectrum, like Robison's, where some errors are obviously unavoidable; but have been corrected by repeated comparison of the focal lengths of the convex and concave lenses in the very best achromatic telescopes selected for the

purpose, where, when a high magnifying power was used, the least discoloration would have been observable; and as these foci are always in the same ratio as the disperse powers, no other method of determining these powers can have similar pretensions to accuracy.

When the convex and concave lenses are both ground and polished (see GLASS and GRINDING), they require some care in putting them properly into the tube, so that they may have their common axis coinciding with the axis of the eye-glasses, in order that every part of the field of view may be equally distinct and free from colour: and as there will always be some errors of workmanship, and as both lenses, but particularly the flint, may not be perfectly homogeneous, one of the lenses must be turned round in the common cell, till the faults of one lens are observed to correct those of the other as much as possible; which will be known when the vision is most distinct, or the object best defined. Should any colour remain about the edges of the object, the prismatic aberration is not corrected; and if indistinctness does not take place soon, and at equal distances from the point of distinct vision, when the eye-tube is moved in and out, the correction for spherical aberration is not perfect. A double object-glass is much more easily adjusted for a good central position, and for the counteraction of opposite errors of workmanship and imperfection of glass, than a triple one, and has moreover more light, in consequence of having but four reflecting surfaces; but as it does not admit of any change of the faces in the final adjustment, the lenses require to be both truly calculated and nicely worked, in order to make the practice correspond with the theory; which is probably the reason why triple object-glasses, that admit of changes in their positions, are most frequently made, particularly for short telescopes: besides, half a dozen of these lenses may be ground and polished at the same time; whereas, for a double object-glass, each lens requires to be ground and polished separately, and with the greatest care.

*Triple achromatic Object-glasses.*—After having explained the theory, and exemplified the construction of a double achromatic object-glass with great minuteness, we come now to treat of triple object-glasses, that shall have the achromatic property; but it will not be necessary to give so many examples, nor such minute explanation, as seemed requisite in our preceding part of this subject, seeing that the calculations for a triple object-glass are grounded on those that we have given for a double one, and do not materially differ from them. It will, however, be proper to shew how the compound focus of three lenses is determined, before we proceed to find the achromatic proportions of the respective radii.

First, we must have recourse to our *fundamental theorem*, (of Table I. of theorems for the refractive foci of lenses,)

*viz.*  $f = \frac{p dr R}{dR + dr - p R r}$ , where  $p$  is the reciprocal of

the refracting power of the medium employed, or of

$\frac{m - n}{n}$ , the measure of that power,  $r$  and  $R$  the radii, as

before, and  $d$  the radiant distance. To apply this theorem to a system of glasses, as B, C, D, &c. which we propose doing, it is convenient to substitute, for the general expres-

sion  $\frac{1}{p}$ , the letters  $a, b,$  and  $c,$  as peculiar to each medium

respectively. Supposing now our three lenses arranged in the order B, C, D, with B next the radiant object (as in

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fig. 12. Plate XXVIII.), we first determine the focus of B, which becomes in this case, if we substitute  $\frac{1}{a}$  for  $p$ ,

$$F = \frac{1}{a} \times \frac{drR}{dR + dr - \frac{Rr}{a}} = \frac{drR}{adR + adr - Rr}$$

Now  $f$ , the focal distance of B, thus found, is manifestly the radiant distance of the second or middle lens C; and as the general theorem above referred to involves the radiant distance  $d$ , we have only now to apply that theorem again

to the second lens C, substituting, as before,  $b$  for  $\frac{1}{p}$ , and

for  $d$ , the quantity last found as the focus of B. This gives the compound focal distance of these two lenses B and C, which we will call  $\phi$ ; and this again becomes the radiant distance of the lens D: therefore, lastly, the general theorem

is again applied to this lens, substituting  $c$  for  $\frac{1}{p}$ , and the

last found focus ( $\phi$ ) for  $d$ ; by which process, we arrive at the compound focus ( $\Phi$ ) of all the three lenses. In the application of these successive steps, it will be proper to attend to the signs of the quantities, where one of them, which in our case is the middle one, has its focus negative with converging rays. To exemplify this process in a triple object-glass for parallel rays, let B represent the outermost lens,

which we will consider as a double convex lens with  $\frac{m-n}{n} = a = 0.53$ , and  $r$  and  $R$  each = 10; let C be the double

concave of similar radii  $'r$  and  $'R$ , and with  $\frac{m-n}{n} = b = 0.6$ ; and let D be a plano-convex, and consequently  $R$

infinite, but  $r = 10$ , as before, and  $\frac{m-n}{n} = c = a = 0.53$ :

then for the focus of B, putting  $\frac{1}{p} = a$ , we have  $\frac{1}{a} \times$

$$\frac{drR}{dR + dr - \frac{Rr}{a}} = \frac{drR}{adR + adr - Rr} = \frac{drR}{adR - rR}$$

( $adr$  being neglected, when  $R$  is infinite) =  $\frac{dr}{ad - r}$ ; and

since  $d$  is also infinite with parallel rays, the expression becomes  $\frac{r}{a} = F$ , as in our first table of theorems for the

refracted foci of lenses, for the first lens B. This expression is now put for  $d$ , when we come to consider the theorem as

applied to C: here we have  $\frac{1}{p} = b$ , and the expression

$$\text{becomes } \frac{1}{b} \times \frac{drR}{dr + dR - \frac{rR}{b}}, \text{ or } \frac{drR}{bdr + b dR - rR};$$

then, as  $r$  is taken equal to  $R$ , it will be  $\frac{dr}{2bd - r} = 'F$

of the lens C. Now, if in this expression we substitute  $\frac{r}{a}$ ,

the focus of B, for  $d$ , we have for  $\frac{dr}{2bd - r} \times \frac{r}{a} \times$

$$\frac{r}{2br - ra} - r = \frac{r}{2br - ra} = \frac{r}{2b - a} \text{ for } \phi, \text{ the compound}$$

focus of B and C, or rather, as the rays fall converging on C, and  $2b$  is more than  $a$ , =  $\frac{-r}{-2b - a}$ . Again,

this quantity will become  $d$  for the lens D, and putting the same substitution as before, in the general theorem for D, where  $\frac{1}{c}$  is put for  $p$ , we shall have  $\frac{1}{c} \times$

$$\frac{drR}{dr + dR - \frac{rR}{c}}, \text{ or } \frac{drR}{c dr + c dR - rR}, \text{ or, when } r = R,$$

$$\frac{dr}{2cd - r}; \text{ hence we obtain } \frac{r}{2b - a} \times \frac{r}{2c \times \frac{r}{2b - a} - r} =$$

$$\frac{r^2}{2c \times r - 2b - a \times r} = \frac{r}{2c - 2b + a} = \Phi, \text{ or com-}$$

pound focus of all the three lenses, B, C, and D. Let us take, by way of example, three lenses as follow; viz. B, a double convex lens of crown-glass, with its refractive power by experiment = 0.53 =  $a$ , and with equal radii,

where  $r$  and  $R$  are each = 10; let the second lens C be a double concave of flint-glass, with the same radii, and of a refractive power = 0.6; and let the third lens D be a plano-convex of crown-glass, of a refractive power of 0.53 also, with  $R = 10$  likewise; then, according to our last expres-

$$\text{sion } \frac{r}{2c - 2b + a}, \text{ we have } \frac{10}{2c - 2b + a}, \text{ or } \frac{10}{3c - 2b}$$

$$= \frac{10}{1.59 - 1.2} = \frac{10}{0.39} = 25.6 = \Phi. \text{ In this way}$$

the compound focus of any number of lenses may be determined, and the course of the rays might be traced in a geometrical figure out of one glass into another, until they come to their ultimate focus.

For instance, let us consider S and  $s$ , in fig. 12, to be two parallel solar rays incident on the first lens B, at the points  $b$  and  $b'$ : these rays, on entering, are bent towards the axis  $z\phi$ , and then from the points of emergence tend to their principal focus  $f$ ; but being intercepted by the double convex lens C, they diverge, after entering at  $c$  and  $c'$ , in a direction which points backwards to the virtual focus  $\phi$ ; but in their progress, they again become incident on the plano-convex at the points  $d$  and  $d'$ , and are again refracted towards the axis, and meet in a distant point  $\Phi$ , which is, therefore, the compound focus of all the three lenses. And if we conceive the parallel rays, S and  $s$ , to be pencils of solar rays, that disperse on entering the convex lens B, they will disperse in a contrary direction on entering the concave C, and will again, on entering the plano-convex lens D, have the excess of dispersion of C counteracted by a second opposing dispersion of D, and, instead of coming to unite at the distant points P and Q, to which they tended on entering D, they will meet, by virtue of the prevailing refraction of the two lenses B and D taken jointly, over the refraction of C taken separately, at the compound focus  $\Phi$ , where the image of the sun will be formed; and if both the focal distances and radii of curvature of all the lenses were achromatically adjusted, as we shall presently direct, the image would be free from colours, and well defined.

The same determination of the foci  $f$ ,  $\phi$ , and  $\Phi$ , in any combination, may, however, be obtained more conveniently

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in practice, when  $r$  and  $R$  are unequal, from our former practical theorems, thus: let us determine the compound

focus of  $B$  and  $D$  by the theorem  $\frac{F \times F}{F + F}$ , as they have

each a positive focus, and call this focus =  $\phi$  geometrical,

and then  $\frac{\phi}{2a}$  will be  $\phi$  refracted; and secondly, let 'F geometrical be turned into  $\frac{F}{2b}$  for the refracted focus of the

concave  $C$ ; and then, by the theorem  $\frac{F \times 'F}{F - 'F} = \phi$ , we

shall have  $\phi$  for the compound refracted focus of the triple object-glass, or length of the telescope: for example, taking

the same data as before, we shall first have  $\frac{10 \times 20}{10 + 20} = \frac{200}{30}$

= 6.66 =  $\phi$ , and  $\frac{6.66}{1.06}$ , or  $\frac{\phi}{2a} = 6.28 = \phi$  refracted;

and  $\frac{10}{1.2} \left( \frac{F}{2b} \right) = 8.33 = 'F$  refracted: also, by the

theorem  $\frac{\phi \times 'F}{'F - \phi}$ , because 'F has a negative focus, we get

$\frac{6.28 \times 8.33}{8.33 - 6.28} = \frac{52.33}{2.05} = 25.53 = \phi$ , as was required.

We shall use this method of finding the compound focus  $\phi$  of two lenses, and also  $\phi$ , the focus arising from all the three lenses, where it is to be understood that  $a$ , the symbol for the refractive power of both the crown lenses  $B$  and  $D$ , is taken the same; and that we express the refractive power of  $C$ , the concave, by the symbol  $b$ , as a substitute for 'a.

We must further premise, that when  $T$ , the thickness of each lens  $B$  and  $D$ , is not considered, we shall shew presently that the spherical aberration, arising from any single lens that receives the rays of light, may be diminished as 4 : 1, by the combination of two lenses, to be substituted for that one. Bearing these premises in mind, we now proceed to the consideration of a triple object-glass, that shall have the due corrections for both the prismatic and spherical aberrations. It will greatly facilitate both our explanation and exemplification, if we suppose the two convex lenses  $B$  and  $D$ , having a compound focus =  $\phi$ , to be represented by a single lens  $E$ , with the same focus  $\phi$ , but with a diminished aberration; for then we may proceed nearly as in our seven preceding examples; but reversing the process, when the concave has its radii given, to find the convex lens.

*Example 8.*—Let it be required to construct a triple achromatic object-glass of 30 inches focal length, with the same refractive and dispersive powers as in the first example; viz. with  $m : n$  in the crown as 1.528 : 1, and in the flint as 1.5735 : 1; and with the dispersive powers as 1 : 1.524; and let the two radii of the concave be each 13.9, so as to have 'F, as in the first example.

In the first place we have  $r : 'R :: 1 : 1$ , and, as we have seen above, 'A = 1.666  $\times$  'T, by the general theorem of Huygens; in the next place, because the concave  $C$  is given to find the convex  $E$ , the correcting number  $z$ , found as before, becomes a multiplier, in a reversed operation, and we have 1.666 ('A)  $\times$  'T  $\times$  .883 ( $z$ ) = 1.4715  $\times$  T = 'A corrected: we must also use the former multiplier 1.524 (the dispersive power, or proportional focus) as a divisor, and then we get

$\frac{1.4715}{1.524} = .9655 \times T = A$  of the substituted lens  $E$ , with

a focus =  $\phi$ ; but there is no such small quantity of aberration in any one lens. Let us however see what the absolute aberration 'A will be, unconnected with the factor 'T, which factor we have determined, from the verified sines to the radii 13.9 and 13.9, to be = .1653; therefore 1.4715  $\times$  .1653 = .2432 = 'A absolutely. Now we have seen, in the first example, that .252 is = T of the proper convex; let us

now consider that  $\frac{.252}{2} = .126$  is = T in one of the lenses

$B$  and  $D$ , which we propose to make in every respect similar, in order to have as few different curves, and consequently as few different tools, as possible; then, because .2432 is

the absolute aberration of  $C$ , the concave, we have  $\frac{.24324}{.126}$

= 1.93  $\times$  T = A of either of the convex lenses; but T

is .126; therefore 1.93  $\times$  .126 = .2432 is the absolute aberration of each convex lens, exactly equal to the absolute aberration of the concave. But we have asserted, and

shall demonstrate hereafter, that when the thickness of the lenses is neglected, a proper combination of two lenses, placed at a certain distance from each other, will diminish the

aberration belonging to one four times, and even when the distance = 0, this will be nearly the case: now we have

.9655  $\times$  T = A in the lens  $E$  of equal focus, let us leave out A, and multiply by 4, and we have 4  $\times$  .9655 = 3.862

very nearly, the sum of the aberrations (without T) of the two convex lenses  $B$  and  $D$ , taken together; viz. 2  $\times$  1.93 = 3.86; but yet the absolute aberration of each separate

convex lens (T being considered) is exactly equal to the absolute aberration ('T considered) of the double concave.

This relation of the respective aberrations being once established and confirmed by practice, which Tulley affirms to

be the case, simplifies the complex business of calculating a triple object-glass: for the sum of the absolute aberrations of

the two convex lenses of like glass, must be always equal to double the absolute corrected aberration of the concave

alone, in order to have a due correction for spherical aberration, and consequent indistinctness. Hence, when the focal

distance,  $\phi$ , of the two convex lenses  $B$  and  $D$  is in the same proportion to 'F, the focal distance of the concave,

that their separate dispersive powers are relatively to that of the concave  $B$ , the relative radii of either  $B$  or  $D$ , or of

both, may be varied at pleasure, provided that the sum of their absolute aberrations remain equal to double the absolute

aberration of the concave  $C$ , and provided that  $\phi$ , their compound focus, be not altered. But we have not yet adjusted the two focal distances so as to make the object-glass

achromatic, and  $\phi$ , or the compound focus of the three, to be equal 30 inches. From an equation of the aberration

1.93  $\times$  T, or from .2432 absolutely, we find the ratio of  $r : R$  in each lens to be as 1.34 : 1, which is also agreeable

to Tulley's tables, from which this ratio may be had by inspection; also the rational geometrical focus for these numbers is 1.145. Now according to our first example, we have

seen that when 'F = 13.9 in a telescope of 30 inches focal length, F will be 9.12, when there is only one double convex lens; but here we have two lenses to produce 9.12 =  $\phi$ ,

and therefore, as both lenses are to be alike, we have 9.12  $\times$  2 = 18.24 = F for each separate focus; therefore

$\frac{18.24}{1.145} = 15.93 = R$  of each, and 15.93  $\times$  1.34 = 21.35 =  $r$ ;

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=  $r$ ; and the result of our calculation will stand thus; *viz.*

First convex B  $\left\{ \begin{array}{l} r = 21.35 \\ R = 15.93 \end{array} \right\} F = 18.24, \text{ and } A = 1.93$   
 $\times T = .2432.$

Concave C  $\left\{ \begin{array}{l} 'r = 13.9 \\ 'R = 13.9 \end{array} \right\} 'F = 13.9, \text{ and } 'A =$   
 $1.4715 \times 'T = .2432.$

Second convex D  $\left\{ \begin{array}{l} r = 21.35 \\ R = 15.93 \end{array} \right\} F = 18.24, \text{ and } A = 1.93$   
 $\times T = .2432.$

Also - - -  $\left\{ \begin{array}{l} F \times F \\ F + F \end{array} \right\} = \phi = 9.12$

And - - -  $\left\{ \begin{array}{l} 'F \times \phi \\ 'F - \phi \end{array} \right\} = \Phi = 30.0$

It is hardly necessary to observe, that the quantities T and 'T are here given in *numbers*, for the sake of illustration; but when the quadratic equation is worked, those symbols may be exterminated, and their values involved in the process.

A table of radii for triple object-glasses, in which the two convex lenses of crown-glass, and the one of flint, have respectively the same refractive and dispersive powers as in Table I. and ' $r = 'R$ .

TABLE VIII.—Radii of triple achromatic Object-glasses.

$\phi$	B Convex.		C Concave.		D Convex.	
	$r$	R	' $r$	'R	$r$	'R
6	4.27	3.19	2.80	2.80	4.27	3.19
12	8.54	6.38	5.60	5.60	8.54	6.38
18	12.81	9.56	8.40	8.40	12.81	9.56
24	17.08	12.74	11.20	11.20	17.08	12.74
30	21.35	15.93	13.90	13.9	21.35	15.93
36	25.62	19.11	16.70	16.70	25.62	19.11
42	29.89	22.30	19.50	19.50	29.89	22.30
48	34.16	25.48	22.30	22.30	34.16	25.48
54	38.43	28.67	25.09	25.09	38.43	28.67
60	42.70	31.86	27.80	27.8	42.70	31.86
72	51.24	38.22	33.40	33.40	51.24	38.22
84	59.78	44.60	39.00	39.00	59.78	44.60
96	68.32	50.96	44.60	44.60	68.32	50.96
108	76.86	57.34	50.10	50.10	76.86	57.34
120	85.40	63.72	55.60	55.60	85.40	63.72

*Example 9.*—Let it be required to construct another triple object-glass of 30 inches focal length, with crown and flint-glass exactly similar to what was used in the last ex-

ample; but let the radii of the concave be unequal; *viz.* ' $r : 'R :: 1 : 1.23$ , and in the best position?

In this example we propose to abridge the work thus; first, ' $A = 1.507 \times 'T$  and  $z = .883$ , and  $\frac{'A}{z} = \frac{1.507}{.883}$

$= 1.33 \times 'T = 'A$  corrected; then  $\frac{1.33}{1.524} \left( \frac{'A}{'F} \text{ rat.} \right) =$

$.873 \times T$  for the proportional aberration of the substituted lens E, as before; which is an impossible quantity. The focus of this substituted lens, as in the last example, is 9.12, and consequently  $9.12 \times 2 = 18.24$  is again the focus of one of the two convex lenses to be used, that of the concave

being, as before, 13.9 (for  $\frac{13.9}{1.524}$  is  $= 9.12$ ); whence ' $r$

and ' $R$  will be 12.6 and 15.5 respectively. T, as before, is  $= .126$ , and ' $T = .1653$  (by calculation); hence ' $T \times 1.33 = .2198$  is the *absolute* aberration of the concave lens, as well as that of each of the two convexes of 18.24 focus;

therefore  $\frac{.2198}{.126} = 1.745 \times T = A$  of one of those lenses,

and the root of the quadratic arising out of this equation of A, gives the ratio of the radii, where R is unity, thus; as  $R : r :: 1 : 1.1$ ; and the rational focus, by the proper theo-

rem, is  $1.048$ ; consequently  $\frac{18.24}{1.048} = 17.40$  is  $= R$  of each

convex lens, and  $17.40 \times 1.1 = 19.14$  is  $= r$ ; so that we have now the subjoined results; *viz.*

Convex B  $\left\{ \begin{array}{l} r = 19.14 \\ R = 17.40 \end{array} \right\} F = 18.24, \text{ and } A = 1.747$   
 $\times T = .2198.$

Concave C  $\left\{ \begin{array}{l} 'r = 12.60 \\ 'R = 15.50 \end{array} \right\} 'F = 13.9, \text{ and } 'A = 1.33$   
 $\times 'T = .2198.$

Convex D  $\left\{ \begin{array}{l} r = 19.14 \\ R = 17.40 \end{array} \right\} F = 18.24, \text{ and } A = 1.747$   
 $\times T = .2198.$

Also - - -  $\left\{ \begin{array}{l} \phi = 9.12 \text{ for the compound} \\ \text{focus of B and D.} \end{array} \right.$

And - - -  $\left\{ \begin{array}{l} \Phi = 30.0 \text{ for the compound} \\ \text{focus of B, C, and D.} \end{array} \right.$

The following is a table of radii for triple object-glasses, where the refractive and dispersive powers are as in the last example, but where the radii of the concave are unequal, *viz.* ' $r : 'R :: 1 : 1.1$ .

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TABLE IX.—Radii of triple achromatic Object-glasses.

Φ	B Convex.		C Concave		D Convex.	
	r	R	r	R	r	R
6	3.83	3.48	2.5	3.1	3.83	3.48
12	7.66	6.96	5.0	6.2	7.66	6.96
18	11.49	10.44	7.5	9.3	11.49	10.44
24	15.32	13.92	10.0	12.4	15.32	13.92
30	19.14	17.4	12.6	15.5	19.14	17.4
36	22.97	20.88	15.1	18.6	22.97	20.88
42	26.80	24.36	17.6	21.7	26.80	24.36
48	30.63	27.84	20.1	24.8	30.63	27.84
54	34.46	31.32	22.6	27.9	34.46	31.32
60	38.28	34.8	25.2	31.0	38.28	34.8
72	45.94	41.76	30.2	37.2	45.94	41.76
84	53.60	48.72	35.2	43.4	53.60	48.72
96	61.26	55.68	40.3	49.6	61.26	55.68
108	68.92	62.64	45.3	55.8	68.92	62.64
120	76.56	69.6	50.4	62.0	76.56	69.6

In like manner, any number of tables might be computed for the focal lengths of a triple object-glass, where the lenses have given refractive and dispersive powers, and where the radii assumed for one of the lenses are taken at pleasure; but it will be always desirable to fix on a *concave* lens first in a *triple* object-glass, notwithstanding we have shewn that it is better to assume a *convex* one first, where a *double* object-glass is calculated: for by attending to this direction, the optician will find that counteracting aberrations will be within his reach; and though he may fix on radii in the assumed lens that will not be the best in practice, yet, by changing the ratio of the assumed radii, he will find practicable lenses that will answer his purpose. In our tables of triple object-glasses, the numbers come out very convenient for practice; for in each, both sides of the convex lenses have longer radii than either face of the concave has got, so that there will be no point of contact, in the middle of any of the curves, when they are placed contiguous to one another; and in Table IX. there is just difference enough, between the radii of each of the convex glasses, to allow one of them to be reversed, if it is found that the errors of workmanship, or imperfection of the glass, should require such correction, when the object-glass comes to be finally adjusted. Indeed all the surfaces might be calculated to be a little different from one another, and then there would be the option of eight changes in the final adjustment: but if the glass is homogeneous, and the work well performed, it will always be found best to adhere to the positions for which the lenses have had their radii calculated.

Neither is it desirable, in a *good* achromatic object-glass, to use varnish of any description, as has been recommended.

As we have shewn that professor Robison's data, and the calculations founded on them, do not produce curves proper for an achromatic *double* object-glass, we will conclude this part of our subject by examining if his calculations for a *triple* object-glass are any better adapted for practice. In Dr. Brewster's Table V. (Appendix to his edition of Ferguson's Lectures, vol. ii. p. 418.) a thirty-inch triple object-glass is calculated, according to professor Robison's report of the radii used by the London artists, to have  $r = 18.84$ , (printed by mistake 18.34,)  $R = 22.47$ ,  $r$  and  $R$  each 17.37, and the second convex the same as the first; where, as before, the ratio  $m : n$  in the crown is taken as 1.526 : 1, and in the flint as 1.604 : 1, and the ratio of the dispersive powers as 1 : 1.65. If these numbers will make an *achromatic* object-glass, we shall have 1 : 1.65 ::  $F : F'$  exactly; *i. e.* the ratio of the dispersive power will also be the ratio of the geometrical focal distances, agreeably both to theory and practice; but we have, by the theo-

$$\text{rem } \frac{2rR}{r+R}, \frac{2 \times 18.84 \times 22.47}{18.84 + 22.47} = \frac{846.6696}{41.43} = 20.495$$

for the focus of one convex lens, and therefore  $\frac{20.495}{2} =$

10.247 for the compound focus of the two; also we have the focus of the concave = 17.37 in the table, the radii being equal; hence we have as 1 : 1.65 :: 10.247 : 16.90, instead of 17.37; therefore the object-glass is *not duly corrected* for the *prismatic* aberration. This conclusion, which is intelligible by every common reader, corroborates our former inference respecting the want of achromatism in the double object-glasses made from Robison's calculations; but let us pursue the enquiry a little farther, and see what focal distance will accord with these numbers: the refrac-

$$\text{tive power of the convex being } .604 = a, \text{ we have } \frac{10.247}{2a}$$

= 9.74 for the *refracted* focus thereof; and the refractive

$$\text{power of the concave being } .526 = b, \text{ we have } \frac{17.37}{2b} =$$

14.38 for its refracted focus, and by our theorem  $\frac{F \times F'}{F - F'}$

$$= \Phi, \text{ we have } \frac{14.38 \times 9.74}{14.38 - 9.74} = \frac{140.0612}{4.64} = 30.18, \text{ \&c. for}$$

the focal length of the object-glass; which is much nearer to the proposed length than the focus of the double object-glass was which we before examined. If we calculate this triple object-glass according to our method, as practised by Tulley, we must begin with 16.9 as the proper focus for the concave, of which we disregard the negative sign, as of no importance in our mode of calculating; we shall then have as 1.65 : 1 :: 16.9 : 10.247, and this ratio must not be compromised, on any consideration, as being the *achromatic* ratio, on a supposition that the refractive and dispersive powers, as above stated, are in natural proportion; then as the radii  $r$  and  $R$  are assumed *equal*, the aberration of the concave will be

$$1.666 \times T, \text{ and } \approx .826; \text{ therefore } \frac{1.666}{.826} = 1.376 = 'A$$

corrected; and  $\frac{1.376}{1.65} = .834 = A$  of the substituted single

lens E, which, as before, is an impossible quantity to be in *one* lens; but this being doubled, will be  $1.668 \times T$  for the proper quantity of each lens; or multiplied by 4, will be a proper

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proper quantity for the sum of both the convex lenses; then 'T being found = .136, and T = .112 in each convex, we shall have A = 1.668 × 2 × .112 = .1871 for each convex, and 'A = 1.376 × .136 = .1871 also, for the concave, and consequently the ratio of r : R as 1.01 : 1; then by using the proper theorems, as before directed, these radii will come out r = 20.57, and R = 20.37 in each convex, while the concave will have each of its radii = 16.9, as originally assumed; and if the dispersive was great enough for the refractive power, as above specified, not only would the object-glass be *achromatic*, but its focal length would be = 30. But we find the geometrical F = 10.24, and re-

$$\text{fracted } F = \frac{10.24}{1.056} = 9.696, \text{ and } \frac{F}{2a} = \frac{16.9}{1.198} = 14.107 =$$

$$'F \text{ refracted, and } \frac{F \times F}{F - F} = \phi, \text{ gives } \frac{14.107 \times 9.696}{14.107 - 9.696} =$$

$$\frac{136.781}{4.451} = 31 \text{ very nearly; and hence we infer, that the}$$

dispersive and refractive powers are *irrational* in this calculation, and the excess in the focal length is double the quantity with these two convex lenses, B and D, to what we found it with one, in a double object-glass, in our former examination. We are not however disposed to depreciate the mathematical labours of a man, whose memory will always be dear to every lover of science, and whose article TELESCOPE in particular has obtained the encomium of an eminent contemporary mathematician; but we have felt it our duty to point out the source of inaccuracy, which, by entering into the data, has affected the result of long and tedious calculations, and may have given much trouble to many, as we know it has done to some opticians, who have attempted to copy those results in practice. The learned professor has indeed stated, as he proceeds, that the value of certain appreciable quantities has been neglected, to simplify the process; and if those quantities had affected the focal distance more, and the ratio of the radii r : R, and also that of F : 'F less, the resulting prismatic and spherical corrections might have been more perfect, even with a defect of dispersive power, than we now find them. We have not room, however, to enter farther into particulars.

From Dr. Brewster's experiments, made in his "Treatise on New Philosophical Instruments," it appears that the *green* ray is not always in the *middle* of the solar spectrum, and that with rock-crystal it is at the opposite side of the middle from what it is in glass; hence Tulley infers, that if glass could be found of the same dispersive power as rock-crystal has, the intermediate colours might be corrected as well as the extreme colours; and that the secondary spectrum would disappear. To effect this improvement, the convex lens of rock-crystal must be at one side of the concave of flint, and the convex of crown or other glass, with equal dispersive power to that of the crystal, must be at the other side. This object is worthy of the optician's future consideration and pursuit.

*Celestial achromatic Eye-pieces.*—We have already explained, in the former part of this section, how the focus of two glasses, placed at a given distance from each other, may be ascertained, and also what is the focus of a single imaginary lens that shall be equal to them both in power: we propose therefore presently to return to the same figure, (fig. 8. Plate XXIV.) in order to shew what the advantage will be in point of *distinctness*, which is as essential a quality in an eye-piece as power. But, in the first place, let us suppose in fig. 10. the points 1, 2, and 3, so many points of an ob-

ject, of which the image is formed at F, after passing through any lens A B; then as the point 1 has rays issuing from it, that fall on every part of the lens, and as these rays are differently refracted at different distances from the axis, both towards A and towards B, there will be several images of this point at the focus F, lying contiguous to each other; but the rays that come to a focus, after passing in and near the central part of the glass, will form their images very closely together, so as very nearly to coincide. The same will be true of the points 2 and 3 separately considered, under the same circumstances, so that while the single lens A B continues to produce both prismatic and spherical aberrations, there will be a confusion or *indistinctness* in the image, arising from a promiscuous mixture of a number of contiguous and nearly coincident images arising out of the spherical figure of the lens, as well as fringes of colour arising out of the dispersion of the differently refrangible rays. This indistinctness is more considerable in a lens used as an object-glass, than as an eye-piece; because the image formed by it becomes an object to be viewed by means of the eye-piece, and therefore any distortion, confusion, or colouration that exists in the image, will be *magnified* by the eye-piece; and the greater the magnifying power, the greater will be the evil produced thereby. To obviate this consequence, which will exist partially, even when the best compound object-glass is used that art can accomplish, the single eye-glass has been laid aside, and a system of glasses substituted, that will admit of a high power in the eye-piece, without a proportionate increase of indistinctness or of colour in viewing the image. The first arrangement of two glasses, as a substitute for one, to be used as a celestial eye-piece, where inversion of the object is not material, was calculated and applied by the ingenious Huygens, who, not aware that the prismatic aberration could be cured by an opposition of *dispersive* powers, according to Dollond's noble discovery, devised the method of reducing the quantity of spherical aberration by *division*; and the result of his investigations was, that two plano-convex lenses, (which have each but little aberration in their best positions,) when placed at such a distance from each other that their focal points, for parallel rays, might coincide, would have such a compound focus, as would not only greatly increase the power, but still more diminish the spherical aberration. An arrangement of this sort was put into the hands of W. Molyneux by Mr. Flamstead in the year 1686, of which Molyneux determined the compound focus, depending on the radii of curvature of the two glasses and the distance between them, in the manner we have above explained. But the first mathematician who gave the *rationale* of the advantage to be derived from a combination of lenses, as they have reference to the spherical aberration, was sir Isaac Newton, whose method of explaining it Martin has given in his *New Elements of Optics*, part i. p. 27, thus: "Let N B M (fig. 9.) be the spherical surface of a plano-convex lens N G M B; C the centre; C B the radius or semi-diameter taken in the axis; A N an incident ray; and N K the same refracted, cutting the axis produced in the point K. Also let F be the focus of parallel rays which pass through the glass infinitely near to the axis: let F D be a perpendicular to the axis in the point F, then will K F be the curve or difference of the focal distance of parallel rays which are incident near the axis, and at the distance G N, the semi-aperture of the lens. This is called the *aberration* of the extreme ray in *longitude*. Again, let any ray (a n) be incident on the other side the lens, at the distance b G, the refracted part of this ray, n d, will intersect the other refracted ray N D in the point Q, at the perpendicular distance Q O from the axis. This

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is called the *lateral error*, or the *aberration in latitude*. It is evident from the figure, that as the ray (*an*) approaches the extreme ray *AM*, the point of intersection *Q* will approach the axis; and when *an* coincides with *AM*, the point *Q* will coincide with the point *K* in the axis; and it is as obvious that the point *Q* will coincide with *F*, when the ray (*an*), approaching the axis *aB*, at last becomes coincident with it: therefore there is one position of the ray (*an*), in which it will cut the ray *ND* in a point *Q*, which will make  $QO$  a *maximum*, or the greatest of all. If we take the arc  $Bm = Bn$ , and  $BM = BN$ , the rays incident on *m* and *M* will intersect in the point *P* on the other side, and so make  $PQ = 2QO$ ; and it is also plain, that all the rays which fall on the lens between *N* and *M* are refracted through the space *PQ*. Now *PQ* is the diameter of the *least circular space* possible, in which *all the rays* can be congregated, because there will be some ray (*an*) that will meet the extreme ray *ND*, at the distance  $QO = \frac{1}{2}QP$  from the axis. Hence it follows, that the circular space is the *focus*, or place of the *image* of an object, belonging to parallel rays incident on the lens *NM*. Further, by reason of similar triangles  $KOO$ ,  $KFD$ , and  $NGK$ , we have  $QO : KO :: DF : KF :: NG : GK$ . But it is demonstrable, (see *Philos. Britannica*, 3 edit. p. 58. art. 14.) that when *QO* is greatest, then  $KO = \frac{1}{4}KF$ , and also that *KF* is always  $\frac{2}{3}$  of *GB*, the thickness of the lens; so then  $KO = \frac{1}{6}GB$ , and consequently  $GK : GN :: \frac{2}{3}GB : QO$ , whence 
$$\frac{9GB \times GN}{8GK} = OQ;$$
 whence *PQ*, the diameter of the circle of aberration, is known for any given lens.

“It has been demonstrated, that the error *PQ* will always be proportioned to  $\frac{NG^3}{BC}$ ; so that when the radius is given, the error will be as the cube of the aperture directly: and when the aperture is given, the said error will be as the square of the radius inversely. It has also been demonstrated, that when the convex side of the lens *NBM* is turned towards parallel rays, the error *KF* will be but  $\frac{1}{4}$  of the thickness of the lens *GB*, and therefore near four times less than in the other case; for  $\frac{2}{3}GB : \frac{1}{2}GB :: 54 : 14$ , which is almost as 4 to 1.

“It has been further demonstrated, that the aberration *PQ* is as the square of the sine of refraction (the sine of incidence being unity) in all media of different refractive powers: thus if a lens of the same focal distance and aperture were made of glass and water, and suppose those sines in glass to be as *m* : *n*, and in water as *m* : *n*; then will *PO* in the glass lens be to the same in the water lens as *m* : *m*<sup>2</sup>, or the area of the circles of aberration, and of course the indistinctness of the object will be as the refractions *m* and *m* of the media.

“Whatever has been observed with regard to convex and plano-convex lenses, will hold good in concave and plano-concave ones. And in both sorts, it is supposed that all of them have the same focal distances, apertures, and thicknesses, while we are comparing their respective aberrations.

“Hence it is very evident, that if rays proceed from any point, as (*a*) at an infinite distance to a lens *NM*, (*fig. 10.*) the image of that point will not be a point, but the area of a circle, whose diameter is *PQ*; and, therefore, that point cannot be distinctly represented, but will be rendered indistinct and confused in proportion to the area of the said circle of aberration in the lens, as it is the image of this circle (or dilated point) that is impressed on the retina, and excites the idea of the point in the mind.

“Hence it appears also, that the points in the surfaces or

substances of bodies cannot be perfectly and distinctly seen, as each of them will be dilated into a sensible area; and such as are contiguous, as 1, 2, 3, will have their confused images all blended together nearly in the same space, *viz.* in the circle of aberration, the diameter of which is *PQ*.

“Therefore the stars, which as to sense are only lucid points, will appear to have some magnitude (and not as points) in the focus of the best sort of telescopes, even supposing there were no other cause of confusion or indistinct vision, besides what resulted from the spherical figure of the lens.

“Now, if the error from a spherical surface, or, which is the same thing, the *indistinctness* of vision, depending on, and commensurate with, the spherical aberration of a lens, is as the square of radius inversely; the *distinctness* of vision, on the contrary, will be as the *square* of the radius directly; and, therefore, if, by means of two glasses, we can get the view of an object, where the radii of the glasses bear a greater proportion to their respective apertures, than the radius of a single glass of equal magnifying power does to its aperture; it is evident the distinctness of that view will be promoted in proportion to the square of that ratio.

“For example, suppose (*fig. 8.*)  $F - D = y$ , or *OF*, to be the focal distance of the lens *GH*, so that the focus of each of the lenses *NM* and *GH* falls on the same point *F*; then, by the proper theorem, we have  $x = \frac{1}{2}F$ , or  $Qf = \frac{1}{2}CF$ : also, since in this case we have  $F : y :: x : f$ , therefore  $f = \frac{1}{2}y$ , or  $Of = \frac{1}{2}OF$ . Now, since we have the same optic angle *GFO* by both the glasses, as by the single one *EE*, the ratio of the radius *OF* to the aperture *GO*, or of the radius *CF* to the aperture *NC*, is double the ratio of *Of* to *OG*, or of the radius *Qf* to the aperture *EQ*, and therefore the *distinctness* of vision by *both* the lenses is *four times* greater than that by the *single* lens *EE*.

“The same thing may be demonstrated from the consideration, that the aberration *PQ* is, in the same glass, always proportioned to the cube of the semi-aperture *EQ*, or sine of half the optic angle *EfQ*; and that in small angles (as in the glasses of telescopes, &c.) the sine *EQ* is nearly as the angle *EfQ*. The aberration, therefore, being as the cube of that angle, it is plain, if we make the same angle by two refractions instead of one, the quantity of the aberration will be greatly lessened, since the sum of the cubes of the parts will be much less than the cube of the whole; and when the parts are equal, the *sum* of the cubes of *each* will be but a *fourth part* of the cube of the *whole*. Thus, if the whole angle *EfQ* be as 1, the cube thereof is 1; but the half is  $\frac{1}{2}$ , the cube of which is  $\frac{1}{8}$ , and twice that,  $\frac{2}{8} = \frac{1}{4}$ , which is as the aberration arising from the two halves, and is therefore but a *fourth part* of the whole.

“This is evidently the case when the optic angle *GfO* ( $= EfQ$ ) is made by two refractions, by the two lenses *NM* and *GH*, so posited, that the focus of each may fall on the same point *F*; for then the angle  $GfO = LGf$ , which is composed of the two angles  $LGf = TNf = GfO$ , (by reason of the parallel lines *TN*, *LG*, and *FC*,) which is the part made by the lens *NM*. Also the angle *FGf* is the refraction of the ray *NG*, or second refraction of the ray *AN*; and since, in the present case,  $Of = fF$ , and *Of* in small angles is equal to *Gf* nearly; therefore the angle *GFO* is equal to the angle *FGf* very nearly, those angles being in the same ratio with the equal lines *Gf* and *fF*, when they are not large; and the optic angle  $GfO = GFO + FGf$ ; consequently the aberration *PQ* is but a fourth part so great by the two lenses *NM* and *GH* together, as it is by lens *EE* alone.

“But to render this theory general for any position or form of

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of the lenses NM and GH, it is evident, since the aberration is lessened by dividing the optic angle, that the *distinctness* of vision will be thereby promoted; and because each of the angles contribute thereto in proportion to its magnitude, the joint effect of both parts, or angles G F f and f G F, will be as the product or rectangle under both, or as the rectangle of the lines O f and f F; but, according to our former notation,  $Ff = F - D - f$ ; and  $O f = f$ ; consequently  $Ff - Df - ff$  will be every where as the distinctness of vision by the two lenses, above that of a single lens of the same magnifying power.

“Let the degree of distinctness thus obtained be represented by  $G = Ff - Df - ff$ ; when this is a *maximum*, or the greatest possible, the fluxions thereof will be nothing; *viz.*  $Ff - Df - 2ff = 0$ , whence  $F - D = 2f$ ; or  $FO = 2Of$ ; that is,  $Of = fF$ , or the angle G F f = f G F, in the *best* position of the lenses, as before demonstrated.

“Consequently, since in that position we have shewn the distinctness of vision to be four times as great as by a single lens, this will be the whole effect of a combination of two glasses, and it may be shewn that three glasses will produce nine times the distinctness, and so on in proportion to the *square* of the number of glasses; but then if we consider the evil to be remedied is but small, and the damage we sustain in *loss* of light and irregularity of refraction through so many lenses, we may soon make the remedy worse than the disease; and every thing considered, it appears probable that two lenses are better than a greater number, particularly for a celestial eye-piece.”

By similar reasoning we may explain the advantage of any other eye-piece, as Bolcovich's, when we know the radii, the position, and the distance of the lenses that compose it. The Huygenian eye-piece, which we have said has the foci of the two plano-convex lenses, as 3 : 1, at the distance of 2, with 1 next the eye, and the curves exterior to the eye, is peculiarly adapted for a reflecting telescope that has only the spherical aberration; but for a refracting telescope, though achromatic, a little deviation from this form was found necessary to correct the remaining prismatic aberration also. On enquiring of the best opticians, we learn that the final adjustment of distance between two lenses, in a celestial achromatic eye-piece, is made from trials in the tube of the telescope it is intended for; because this distance, and indeed the ratio of the radii of the two lenses, will greatly depend on the state of convergence of the rays, when they are incident on the first surface of the interior glass; and this state will depend on the focal length of the telescope, conjointly with the aperture, and achromatism of the object-glass: so that it would not answer any good purpose to give a table of dimensions, which might mislead rather than assist the young optician in his practice. The form of an achromatic celestial eye-piece, composed of two plano-convex lenses, is represented in *Plate XXVIII. fig. 13*, where the distance exceeds the focal length of the lens 1 next the eye, and in which consequently the image is between the lenses; which is the usual construction when the heavenly bodies are viewed without any reference to the measurement of angles; but as the place of the image will vary in some degree with a change of distance, in taking terrestrial measures, there is another form, commonly called Ramsden's, which is more suitable for micrometrical measurements; because the image, being beyond both lenses, (counting from the eye,) keeps its place, as it regards any scale, wire, or spider's line, that may be used in a micrometer: this form is given in *fig. 14*. of the same plate, and has the position of the interior face reversed, so that the plane face may be parallel to the contiguous image to be viewed: these two lenses are sometimes alike, and

always nearly so, in focal length; and the distance between them is less than the focal length of either by such a quantity, that the compound focus falls just beyond the flat face of the interior lens 2, where the image and scale, wire, or line coincide in due adjustment for vision. This form has likewise the advantage of reduced aberration, and is sometimes called the *positive* eye-piece, in opposition to the other form, which is therefore by some astronomers called the *negative* eye-piece. This positive eye-piece is also best adjusted to the instrument of which it is destined to form a part; and either lens may exceed the other in focal distance in a small degree, as circumstances may require.

When this eye-piece is used with a transit instrument, zenith sector, equatorial, or circular instrument for taking altitudes, it is convenient to put a diagonal reflector between the lenses, and to have the eye-lens in the *side* of the tube, for the purpose of taking observations in high altitudes, or even in the zenith. This form is seen in *fig. 15*. of the same plate, and is called a prismatic eye-piece.

The *terrestrial eye-tube* is that which gives an *erect* position to the object, as viewed in a telescope of the refracting sort, to which only it is applied, though it might be applied to the Cassagrainian reflector with equal advantage. It has been seen that, originally, this eye-piece was composed of three similar lenses, placed from each other respectively at the sum of their focal distances, as in *fig. 3. Plate XXV*. In this arrangement the magnifying power is not increased, unless the lens, T U, nearest to the eye has its focal distance diminished more than the rest: but the aberration that would arise from the figure of the field-lens C D, is diminished about *nine* times, if we disregard their thickness, *viz.* as the square of the number of glasses employed between the image I M, and the eye at K; consequently, the advantages derived from this eye-piece of Rheita are two-fold; for, first, it gives an erect position to the object; and, secondly, it greatly diminishes the quantity of spherical aberration, and consequently produces a corresponding distinctness; but the *power* of this eye-piece is *simply* that of one of the three lenses. To effect an increase of power at the same time that the two preceding advantages are preserved, various arrangements of three, four, and even of five lenses, have been made for the purpose of constructing a good terrestrial achromatic eye-tube; and the ingenuity of a Dollond and of a Ramsden has been exercised successively to accomplish the desired object. These arrangements, so far as the diminution of spherical, and even of prismatic aberration was concerned, have been understood and explained; but the total power arising out of a number of lenses differently shaped, and placed at different *distances* relatively to each other, has not been so clearly explained; and it should seem, from the manner in which such arrangement has been described by different authors, that the result has generally been ascertained practically rather than theoretically; which indeed must in some degree be the case whenever *power*, or, which is the same thing in effect, whenever actual focal distance, simple or compound, is to be accurately determined. We will not proceed upon the intricate plan of tracing the passage of a refracted pencil of rays through various lenses of different refractive qualities, and placed at various intervals, until they arrive at their last focus, or place of the image of a distant radiant body; neither do we propose to follow the more familiar but less instructive method of simply giving in figures the radii and relative distances of three, four, or five lenses, that shall compose an achromatic eye-tube; but, avoiding each extreme, we shall describe the most improved eye-tube for erect position, upon the principles of a *compound microscope*, which instrument this tube really

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really is of itself, and that of the best construction. We have referred an account of the *theory of the compound microscope* until we arrived at this article, on purpose to shew the intimate connection that it has with the refracting telescope, which, it will be seen presently, is also the case with a compound *reflecting* microscope, that composes a portion of both the Gregorian and Cassegrainian telescopes. First, let  $a b$  (*Plate XXV. fig. 8.*) be considered as an object to be magnified for examination by a compound microscope of the simplest construction; let  $d f$  be the small object-glass, of which  $i$  is the solar focus; then as the radiant object  $a b$  is at a small distance from the lens  $d f$ , beyond its solar or principal focus, the incident rays coming from it will converge slowly after passing through this lens, and consequently the conjugate focus at the other side of the lens will be remote, as at  $A B$ , where an inverted image,  $A B$ , of the object  $a b$  will be formed; and if the object is brought nearer to the solar focus  $i$ , the image  $A B$  will recede with a linear amplification, for it always subtends the same angle at  $e$ , the centre of the object-lens, that the object subtends at the same point; it is therefore obvious, that the linear amplification of the image, compared with the length of the object, will be as their respective distances from the object-

lens, *viz.* as  $\frac{C e}{c e}$ ; and, consequently, the farther the image

recedes, that is, the nearer the object is brought towards the solar focus  $i$ , the more it will enlarge, which principle is the basis of both the magic lantern, and solar as well as lucernal microscope. Let us call the ratio of the object to its image  $1 : 5$ , as in our figure; then if  $D F$  be a double convex eye-glass, placed so that this image,  $A B$ , may be in its principal focus, the rays of light coming from it, now considered as a *radiant*, will, by passing through this lens, become *parallel*, in which state they will enter the eye at  $L$ , and after converging to a new focus on the retina, will there make a picture of the image of the object, but in a reversed position. The principal pencil of rays coming from  $d$  and  $f$  of the object-lens, will meet at  $C$ , the centre of the image, and diverge till they come to the eye-lens  $D F$ , where they are made parallel, and where they define the size of the eye-hole in the cap of the eye-piece; while the angle of vision will be  $G E H = B E A$ . In this situation, the image  $A B$  is magnified by the eye-glass inversely as its focal distance, that is, as many times as  $F C$  is contained in  $e C$ ; for the visual angle  $B E A$ , subtended by  $B A$ , exceeds the angle  $B e A$ , subtended by the same line  $B A$ ; and, consequently, its opposite angle  $b e a$ , subtended by the object, is in the ratio of  $C e : C E$ ; and also, when  $C E = c e$ , in the ratio of  $C e : c e$ ; and the whole amplification will consequently be by compounding the ratios =  $\frac{C e^2}{C E \times c e}$ . But in this construction the field

of view is small, though the power is great; and the colorific effect of the prismatic aberrations, as well as the indistinctness and distortion of the figure of the object, are fully experienced. To do away these impediments to a pleasing view of the object, a second lens was introduced into the eye-piece, as  $M N$ , in *fig. 11. Plate XXIV.*, the original intention of which was, principally, to enlarge the *visible area*, or circle of vision, which it did effectually, while, at the same time, it diminished the power, and in some measure the spherical aberration, though the latter advantage does not seem to have been contemplated; and in this state the compound microscope remains in the present ordinary construction, one of the three lenses,  $d f$ , being the *object-lens*; the second being the *amplifier*  $M N$ ; and the third the

eye-glass  $G H$ . Now if we compare the compound celestial eye-piece in *fig. 8*, before described, as having the same power with the single imaginary lens  $E E$  in the same figure, we shall see that the only difference in the two arrangements is, that the image in *fig. 11.* is between the lenses, but in *fig. 8.* beyond them both. We have demonstrated the advantages of the combination in *fig. 8*, and have shewn that those advantages will continue, if the image be formed between the lenses; and also that making the distance between the glasses to exceed the focal distance of the eye-glass, will bring the image into this intermediate situation, as is actually the case in the best achromatic telescopes, with both the celestial and terrestrial eye-pieces; particularly when the wire, or cobweb micrometer, is not used. If then we consider the object  $a b$  in *fig. 11.* to be the small or *primary* image of a distant object, formed in the focus of the achromatic object-glass, the image  $A B$  will become the image of an image, or *secondary* image, in a contrary position; and this is the one actually viewed in the terrestrial tube of a telescope. Let us in the next place conceive the terrestrial tube to have only the three glasses that compose the arrangement of the compound microscope, and it is obvious that the image  $a b$  will be rendered as distinct, and as much enlarged in it, as the object  $a b$ , of similar dimensions, would be in the like compound microscope. Thus have we a terrestrial eye-piece with an arrangement of *three* glasses, which magnifies greatly, and, so far as the pair of eye-glasses are concerned, is achromatic; but with respect to the object-lens  $d f$ , (which might indeed have been made achromatic by a balance of contrary *disperse* powers, on Dollond's plan of an object-glass for a telescope), there remained room for improvement; and this has been effected by the same principle of *division* of the aberrations, that contributed to the improvement of the celestial eye-pieces with two lenses.

*Plate XXVIII. fig. 15.* shews a combination of two plano-convex lenses, that perform the office of one double convex lens in a compound microscope, or terrestrial eye-tube, in which the lens  $A$  is placed next the object in a microscope, or image in a telescope, with its plane face outwards, and the lens  $B$  is placed at a distance from  $A$ , that exceeds the focal length of either of the two lenses, and that is also greater than the distance between the two eye-glasses; but the proportions vary with circumstances. In the patent micrometrical telescope of Harris, in which the eye-tube is  $7\frac{1}{4}$  inches long, the focus of the eye-glass is  $1\frac{1}{4}$ ; that of the field-glass, or amplifier,  $1\frac{1}{2}$ , and the distance  $2\frac{1}{4}$ ; while the lenses of the eye-end are both menisci; the outermost lens having a focus of  $1\frac{1}{4}$ , and the inner lens one of  $1.2$  or  $1\frac{1}{5}$ , at a distance of  $2\frac{1}{4}$ . This novel form of a terrestrial eye-tube is found very good for a short telescope, and answers equally well for any variable length of focal distance of the patent object-glasses; and when the telescope has its focal length invariable, the difference between each separate pair of lenses may be varied at pleasure, and then the *power* of the whole combination will vary with the variations of this distance. In all other telescopes of the refracting kind, the two eye-glasses, as well as the pair of lenses at the remote end of the terrestrial tube, near the primary image, are all plano-convex, as we have shewn; and that combination which suits a short telescope, will generally suit a long one; but frequently that which is made purposely for a long one, will not suit a short one. A very good 12-inch terrestrial eye-tube, for a day and night telescope of two feet length, that we lately examined, has the proportions in the eye-tube somewhat different from telescopes with larger power; the eye-lens has a focus of 2 inches; the amplifier  $3\frac{1}{2}$ , at a distance of 3 inches; and the third and fourth lenses are

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respectively  $3\frac{1}{2}$  and 3, at a distance of  $4\frac{1}{2}$ ; the fourth lens being that next the primary image. The convex portion of all the four lenses is turned to the centre of the tube in all the terrestrial eye-pieces, except when Ramsden's, or the positive eye-piece, is substituted for the common or negative one. Another good day eye-tube, of  $9\frac{1}{4}$  inches length, has the first, or eye-lens,  $1\frac{1}{4}$ ; the second, or amplifier, 2, at a distance of  $2\frac{1}{2}$ ; the third 3, reversed as usual; and the fourth  $2\frac{1}{2}$ , at a distance of  $3\frac{1}{2}$ . When a great power is wanted, the celestial eye-piece does very well for the eye-end of the terrestrial tube; and it would be an advantage to every good telescope, if they were fitted for this purpose by an adapter, such as we shall have occasion to describe in our fifth section; for then each telescope would have a great variety of powers; and if the celestial eye-pieces were screwed into a separate tube, instead of a simple adapter, the power might be varied at pleasure, in any proportion, by altering the distance between the two separate pairs of lenses, as we shall hereafter shew has been done by the writer hereof, in his micrometrical measurement of distances in the last section of this article.

But to resume the consideration of our compound microscope (*Plate XXIV. fig. 11.*), we now see that the lenses CD and  $df$  combine in such a way, that the object  $ab$ , instead of being a little out of the focus of the single lens  $df$ , is a little way out of the compound focus of the two; and a circular piece of metal, perforated in the centre, called a diaphragm, is fixed in the tube, at the separate focus of the lens  $df$ , to exclude the coloured rays arising from the prismatic dispersion of this lens; and then the rays of least dispersion, that pass through this hole, enter the lens CD near its centre, and, therefore, have afterwards but little spherical aberration; on which account it is obvious, that the image in the microscope, or secondary image in the telescope, will be distinct and colourless; and it is very extraordinary, that while improvements are daily meditated in every mechanic art, the addition of a second lens, to diminish the aberrations, is not yet made to the object-end of the compound microscope, though the same thing has been done in the terrestrial eye-tube of an achromatic telescope, which not only answers precisely the same purpose, but is in fact itself an achromatic compound microscope.

After having gone through our explanation of the practical forms of both the double and triple achromatic object-glasses, and also of the various achromatic eye-tubes, which we have endeavoured to render intelligible to young opticians, we shall finish this long section by giving a short account of the different arrangements of the glasses of an achromatic telescope depending on these various forms, as we have already done with respect to the old telescopes, represented by *figs. 1, 2, and 3. Plate XXV. Fig. 4.* shews the arrangement of a double object-glass in conjunction with a negative eye-piece of two lenses, with the image between them, the power of which is simply the compound focal length of the object-glass A, divided by the compound focal length of the eye-lenses B and C. This arrangement is that of the best achromatic telescope with a celestial eye-piece, and, being shorter than the terrestrial telescope, is more conveniently managed. When the eye-piece has a slip of graduated mother-of-pearl, contrived by Cavallo, and divided by Mr. Barton, at its diaphragm, it makes an useful micrometer for measuring small angles: and when this eye-piece is taken out, the wire or cobweb micrometer may be screwed in, instead thereof; and then, if the telescope is of a good size, an angle within its reach may be measured with great accuracy. With this celestial telescope the object is inverted, and the light will be directly as the area

of the aperture, and inversely as the magnifying power. *Fig. 5.* gives the arrangement of the lenses in a terrestrial achromatic telescope with a triple object-glass; in which A is the object-glass, B the eye-lens, and C the amplifier, or field-lens of the eye-piece BC; D is the third lens, that diminishes the aberration of the fourth lens E, which, in a compound microscope, is called the object-lens. This is considered the best construction of a terrestrial telescope. The power is equal to the compound focus of the object-glass, divided by the compound focus of the eye-piece BC, when the quotient is multiplied by the first part of the microscopic power of the lenses E, D, which part will vary with the distance between the two pairs of lenses. The arrangement in *fig. 6.* differs from that in *fig. 4.* only in the eye-piece, which has here the image beyond it. Also the arrangement in *fig. 7.* differs in like manner from that in *fig. 5.*; and what we said respecting power and light of those lenses, is equally true of these. The eye-pieces of the telescopes in *figs. 6. and 7.* are those of the wire and cobweb micrometers.

3. *Theory of cata-dioptric Telescopes.*—When the image of a distant object is formed in any telescope entirely by reflected rays meeting at a focus, this image is properly catoptric (from the Greek word  $\kappa\alpha\tau\omicron\pi\tau\iota\kappa\omicron\varsigma$ , *speculum*); but when it is formed partly by reflection and partly by refraction of the rays, in coming to a focus, it is then cata-dioptric, that is, both catoptric and dioptric; and as the image cannot be viewed without an eye-glass, all reflecting telescopes are promiscuously called cata-dioptric.

Before we describe any of the different constructions of a telescope where reflection is concerned, we will explain the principles on which the catoptric theorems are founded, and give a small table of those theorems that determine the focus under different circumstances, as we have already done with respect to the dioptric theorems; at the same time referring our readers for farther information on this subject to the articles CATOPTICS, MIRROR, and SPECULUM. In *Plate XXVI. fig. 8. Astronomical Instruments,* let the curve GE be considered as a portion of a convex speculum, formed from the centre C, and CA or CE its radius; then suppose DA to be a ray of light proceeding from D, the radiant point, in the axis of the speculum, and falling on the point A, from whence it is reflected in the direction of the line A $\phi$ , tending in a contrary direction to a point F, its virtual focus, in the axis of the speculum behind the vertex E: then put DE =  $d$ ; CA or CE =  $r$ ; CF =  $z$ ; and FE =  $f + z = r = CE$ . Now if we suppose the point A to be very near to E, a point in the axis, the angles at D and C will become very small, and will, consequently, have the same proportion to each other as their opposite sides AC and AD have; but AC = AE, and DA may be taken = DE without any sensible error; hence there will be this analogy, ADC : ACD :: CE : DE ::  $r$  :  $d$ . Produce now CA to I, and IA will be perpendicular to the face of the speculum in A, the point of reflection; and, therefore, the angles DAI and IAC will be equal. But DAI =  $\delta$ AC, and IAC = CAF, as being respectively opposite, therefore  $\delta$ AC is equal CAF: also  $\delta$ AC = ADC, and ACD =  $r + d$ , and consequently the angle CAF =  $r + d$ . Again, in the triangle CFA, when the point A is near the axis at E, the angles at A and C will be very small, and will have the same proportion to each other as their opposite sides FC and FA, and the angle FAC : FCA :: FC : FA; but in this case FA may be esteemed = FE, and therefore we have FAC : FCA :: FC : FE ::  $z$  :  $f$ . But we have seen that the angle at C is as DA or DE, that is, as  $d$ , and

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$d$ , and also the angle  $FAC$  as  $r + d$ ; therefore we have as  $f : z :: d : d + r$ ; and by composition of ratios,  $f + z : f :: 2d + r : d$ ; but  $f + z = r \therefore r : f :: 2d + r : d$ ; then by multiplying the extremes and means together, we have the equation  $dr = 2df + fr$ , and dividing by  $2d + r$ ,

there results the theorem  $\frac{dr}{2d + r} = f = EF$ . This may

be considered as the *fundamental theorem in catoptrics*, from which the focus may be determined in any speculum, concave, convex, or even plain, whether the rays fall on it diverging, parallel, or converging; and from a due variation of the symbols and signs, as the case may require, we have all the variety of theorems for finding the focus contained in the subjoined table.

TABLE for finding the Focus of Rays reflected by any Speculum.

Rays.	Convex.	Concave.
Diverging -	$\frac{dr}{2d + r} = f.$	$\frac{-dr}{2d - r} = f.$
Parallel - -	$\frac{r}{2} = f.$	$\frac{-r}{2} = f.$
Converging -	$\frac{-dr}{-2d + r} = f.$	$\frac{dr}{-2d - r} = f.$

To illustrate the utility of this little table, let it be required to determine the respective foci of two specula, both ground and polished, on tools of 30 inches radius, when the radiant object is placed at 300 feet distance, one speculum being convex, and the other concave? In the first place, as the distance is less than infinite, the rays will come diverging from a luminous point; and, therefore, with respect to the convex speculum, we must use the theorem

$$\frac{dr}{2d + r} = f, \text{ which in figures will stand thus, } \frac{300 \times 2.5}{2 \times 300 + 2.5} = \frac{750}{602.5} = 1.245 \text{ feet, or } 14.94 \text{ inches for the required}$$

focus; but for the concave speculum, the theorem  $\frac{-dr}{2d - r}$

$= f$  (or  $-f$ , because the focus and centre of the curve are on the same side of the speculum) will give us these numbers,

$$\text{viz. } \frac{300 \times 2.5}{2 \times 300 - 2.5} = \frac{750}{597.5} = 1.255 \text{ feet, or } 15.06$$

inches for its focal distance; and in like manner may the proper focus be determined for any other radius and distance, however the rays may be circumstanced when they fall on the speculum: whenever they come converging or diverging from a first to a second speculum, the focal point, real or virtual, must be considered as the radiant, and its distance reckoned accordingly.

These theorems, however, imply that the speculum is already made, whereas in many practical cases, the focus is first assumed, and the proper radius of convexity or concavity is required, or, which is the same in effect, the radius of the tool is required that shall be proper for forming the requisite curve. For instance, let it be required to form a tool of such a radius, that an image of any very remote object may be formed, by a speculum ground and polished

to its dimensions, at the distance from its reflecting surface of just 18 inches? In this case, the rays must be considered as parallel, because the object is remote; and, indeed, it is always for a remote object that the curve of a large speculum is formed; consequently the theorems  $\frac{r}{2} = f$ , and

$\frac{-r}{2} = f$ , or  $-f$ , will be suitable for the required purpose,

in both which  $2f = r$ ; therefore  $18 \times 2 = 36$  will be the proper radius of either the convexity or concavity of the tools to be used. If the ray had been diverging, and the focus affirmative, or behind the speculum, for a convex speculum the theorem arising from transformation would

have been  $\frac{2df}{d - f} = r$ ; and for a concave  $\frac{2df}{f - d} = r$ ; but

in the case of a negative focus, or focus before the speculum, the former would have been  $\frac{-2df}{d + f} = r$ , and the latter

$\frac{-2df}{-d - f} = r$ . In like manner, the distance may be determined from the radius and proper focus being given; for,

supposing the focus affirmative, with a convex speculum, the transformed theorem for diverging rays will be  $\frac{rf}{r - 2f} = d$ ,

and with a concave  $\frac{fr}{2f + r} = d$ ; but when the focus is

negative, the former will be  $\frac{-fr}{r + 2f} = d$ , and the latter

$\frac{fr}{2f - r} = d$ . Hence, when any two of the terms  $f$ ,  $r$ , and

$d$  are given, the third may be readily determined.

Thus, in the case of a convex speculum with diverging rays, if we put  $d = r$ , we shall have  $\frac{r}{3} = f$ ; when

$d = \frac{1}{2}r$ , then  $\frac{r}{4} = f$ ; when  $d = \frac{1}{3}r$ , then  $\frac{r}{5} = f$ ;

and when  $d = \frac{1}{4}r$ , then  $\frac{r}{6} = f$ : from which results we

see, that the points  $D$  and  $F$  both approach the speculum in a regular manner, till at last they will coincide at its vertex; and the same will be the case with a concave speculum, when the rays are converging, except that the focus is negative, or on the same side with the centre of convexity.

Also, when a convex speculum is used with converging rays, or a concave with diverging, when  $2d = r$ ,  $f$  will be infinite; or, which is the same thing, the rays will be reflected parallel, as is the case in reflecting lamps; and, generally speaking, the focus of any concave or convex speculum may be made to fall in a given point, accordingly as the radiant object is made to approach to or recede from its principal focus with parallel rays; and wherever the focus is made to fall, there an *image* is formed of the object by reflection, in the same wonderful manner as we have had occasion to mention before, when speaking of its formation by refraction. Likewise the connection between  $D$ , the radiant point, and  $F$ , the focus, is so intimate, that they may at any time change places without error; that is, when  $D$  is the radiant,  $F$  will be the focus; but if  $F$  is taken as the radiant, then  $D$  will be the proper focus in all cases.

In order to shew what proportion the length of an image, formed in the focus of reflected rays, will bear to the length

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of the object which it represents, let DE (*fig. 9.*) be a portion of a convex speculum, C its centre, V the vertex, O B an object, and I its image; and let it be required to find the proportion that the object, or line BO, bears to the image, or line IM. From the centre C, let the perpendicular CA fall on the object or radiant; and from its extreme points O, B, draw OC and BC, to meet the speculum in the points D and E; and do the same in *fig. 10.*, where the curve DE represents a concave speculum: then the line AV will be the axis, in some part of which the rays proceeding from the points O and B will meet, and the points of intersection will be the foci respectively. From O, let a ray OV pass to the vertex of the speculum, so as to make the  $\angle FVA = \angle OVA$ , then will VF be the reflected ray, which tending to the point I, in the axis CO, shall there form the image of the point O of the radiant. In like manner, the ray BV will be reflected in the direction VG, and intersecting the axis CB in M, will there depict the point B of the said radiant; and thus all the intermediate points lying between O and B will be represented between I and M, and a complete image of OB will be formed at IM. If we suppose the object at a great distance, and consequently small, the arc ED of the speculum will be very minute, and not sensibly different from a right line, and consequently will be parallel to the radiant BO, because CA is perpendicular to both BO and ED. Also, since the distances OD, AV, and BE, are very nearly equal, from their contiguity, it is plain that the focal distances DI, Va, and EM, will also be nearly equal; and, therefore, the image IM will be very nearly a right line, and parallel to the radiant OB, as well as perpendicular to CA.

Now from the nature of reflection, we have  $\angle BVA = \angle AVG = \angle aVM$ ; therefore,  $\angle OVA + BVA = \angle aVI + aVM$ ; namely,  $\angle OVB = \angle VM$ ; so that the radiant, or object BO, and its image IM, are seen under the same angle from the vertex of the speculum. But the triangles AV O and a V I are similar, for the  $\angle OVA = \angle aVI$ , and the angles at A and a are both right angles; therefore,  $VA : Va :: AO : aI$ . For the same reason,  $VA : Va :: AB : aM$ ; and  $VA : Va :: OA + AB : Ia + aM :: OB : IM$ ; or, in words, "the distance of the object is to the distance of its image, from its vertex V, as the length of the object is to the length of the image."

From the analogy here deduced, it is easy to form theorems, that shall determine either  $d$ ,  $f$ , or the proportion  $O : I$ , when  $O$  is the length of the object and  $I$  of the image, when the two others are given. For we have given

$O : I :: d : f$ , and consequently  $\frac{I d}{O} = f$ ; but our funda-

mental theorem was  $\frac{dr}{2d+r} = f$ , consequently  $\frac{I d}{O} =$

$\frac{dr}{2d+r}$ , and so  $2dI + Ir = rO$ ; and  $2dI = Or -$

$Ir$ ; consequently for a convex speculum, the theorem will

be  $\frac{Or - Ir}{2I} = d$ ; and for a concave, where  $r$  is negative,

it will be  $\frac{Ir - Or}{2I} = d$ . But if the focus be required

to be negative in a convex, the theorem will be  $\frac{-Or - Ir}{2I}$

$= d$ ; and in a concave, where  $r$  and  $f$  are both negative, it

will be  $\frac{Or + Ir}{2I} = d$ . If  $r$  be required in a convex

speculum, when  $d$  and  $O : I$  are given, the theorem will be

$\frac{2Id}{O - I} = r$ , and in a concave  $\frac{2Id}{I - O} = r$ ; but if the

focus is required to be negative, the first will be  $\frac{-2Id}{O + I}$

$= r$ ; and the second  $\frac{2Id}{O + I} = r$ .

Lastly, when  $d$  and  $r$  are given, to find  $O : I$ , we shall have this analogy for a convex speculum  $O : I :: 2d + r : r$ ; and for a concave,  $O : I :: r - 2d : r$ . But if the focus be negative, for a convex, it will be  $O : I :: -2d - r : r$ ; and for a concave,  $O : I :: 2d - r : r$ ; so that, as we have said, when any two of the three terms are given, the other may be determined by calculation. By way of exemplification, let it be required to find the radius of a concave speculum, that shall make the image of an object, placed at 100 feet, as  $1 : 60$ , in front of the speculum. Now  $f$  being in this case negative, we have the theorem, as before specified,

$\frac{2Id}{O + I} = r$ , or, in figures,  $\frac{2 \times 1 \times 100}{60 + 1} = \frac{200}{61}$

$= 3.28 = r$ , nearly; or if  $r$  be given, and  $d$  required, the

theorem  $\frac{Or + Ir}{2I} = d$  will give  $\frac{60 \times 3.28 + 1 \times 3.28}{2 \times 1}$

$= \frac{200.08}{2} = 100.04 = d$ ; and if 3.28 had been the

exact radius, the distance would have come out exactly 100. If the image and object had been given equal, they would both have fallen exactly at the centre of concavity of the mirror; which coincidence affords a ready method of determining the radius of concavity of any speculum, by means of a luminous point used as an object, and brought so that its image will exactly coincide with it. It is hardly necessary to add here, that a concave speculum forms an inverted and magnified image; and that a convex one makes it erect, and at the same time diminishes it.

We have before shewn how the aberration of the rays of light may be calculated, when reflected to a focus by a speculum of a spherical figure, when the rays are parallel before they suffer reflection; and it has been demonstrated, that for such rays a parabolic curve is the best suited for correcting such aberration, particularly when the image is formed by only one reflecting surface; but when there is a second or small speculum, either concave or convex, employed in forming a secondary image, or in assisting to form the primary one, a parabolic curve will not be the best for correcting the aberration of the rays; because each speculum will have its own aberration; and the practical optician can employ his skill in producing suitable specula for counteracting each other's errors, with respect to the united effect of their separate aberrations, better than the calculating theorist can pretend to direct; for the moment he screws his eye-tube alternately out and in, beyond and short of distinct vision, he knows the nature of the curves of his specula, and whether the indistinctness arising from aberration is the consequence of too much or too little curvature at the vertex of the large speculum, and can make the final alteration accordingly. This practical dexterity, arising out of experience, supercedes the necessity of tedious mathematical calculations, where some part of the data must necessarily be assumed; and it is much to be wished, that practical men, who have excelled

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excelled in this particular, and in other practical niceties, would initiate their successors in the secrets that promoted their excellence, that posterity may benefit from their successful labours; which could not have been Mr. Short's wish, when he deliberately provided for the destruction of his best tools, after he no longer wanted them.

The circumstances that led to the construction of a reflecting telescope did not arise out of chance, as is supposed to have been the case with the dioptric, but out of the difficulty of avoiding the *indistinctness* produced by aberrations of both kinds; and the first arrangement that would probably occur, would be that of a speculum opposed to the eye of the observer, whose head in that case would intercept the incident rays, and prevent their falling on the speculum, unless it were made of an unmanageable diameter. To avoid this inconvenience, Gregory, who was the first to undertake the arduous task of a new construction, devised the expedient of opening a hole in the centre of the large speculum, sufficiently large to admit of the rays that came reflected a second time from a smaller speculum without a central perforation: it would naturally occur to him, that if this second speculum was not larger in diameter than the central hole of the large speculum, no incident light would be intercepted by it, when the rays came parallel, but what would have passed through the central hole of the speculum. This consideration brought the eye to the same end of the tube in which the large speculum was placed, and thus freed the aperture from all obstacles to the free admission of light; but whether the small speculum at first tried was a plain one, or concave, is not of importance to ascertain; it is sufficient for our purpose to know, that a concave one was ultimately adopted, and probably from the property which it possesses of varying the magnifying power to a considerable extent.

We have already said that Gregory's construction of the reflecting telescope is the most ancient, and indeed continues to be the most common, even at this time, on account of the convenience attending its use, and therefore we will begin with an explanation of its theory. *Plate XXVII. fig. 1. Astronomical Instruments*, represents a section of this instrument as it was originally made, and *fig. 2.* is a representation agreeably to its improved modern construction; in both which we shall use the same letters of reference to the corresponding parts. *A B C D*, in each figure, denote the tube of wood or brass in which two concave specula are contained; the large one, *B D*, is perforated at the centre, and placed contiguous to the interior end of the tube, but in such a way as to have a little play when pressed by a circular spring behind it; *E F* is the small speculum, which is of shorter radius than the speculum *B D*, and has its centre placed exactly in the centre of the tube opposite the central aperture in the large speculum, and is so adjusted by the screws behind it, that the image of the large speculum forms a concentric circle on its reflecting surface, when viewed by an eye situated in the central hole of the large speculum. In this instrument, as in the refracting telescope, it will be most convenient to describe first the formation of the primary image of a distant object in the body of the tube, and then the microscopic means applied for rendering this image visible in an apparently magnified state; for in truth there is actually a *compound reflecting microscope* made use of as a constituent part of this instrument, in like manner as the terrestrial tube of a refracting telescope of the best achromatic construction, is in itself a compound *refracting microscope*. In the first place, agreeably to the laws of catoptrics, which we have explained, if we consider *ab* and *cd* two rays of light coming from the centre of a distant arrow in a state of divergence approaching to parallelism, and impinging on the

large speculum at the points *b* and *d* near the remote edges of the speculum, and at equal distances from its axis, they will be reflected inwardly so as to meet at the point *e*, in the common axis of both the specula, and will form the image of the central point of the arrow; and in like manner, any number of rays proceeding from the opposite ends of the said arrow may be conceived to fall on the speculum, and to be reflected to the points *b* and *i*, and to all the intermediate points, so as to form a perfect image *b e i* in an inverted position, because the rays which enter the tube from the right-hand end of the arrow, will after reflection cross the axis, and form the left-hand end of the image, and *vice versa*. When an image is thus formed, if it could be viewed, under sufficiently favourable circumstances, by an eye placed in the vertex or central aperture of the large speculum, it would subtend the same angle as the object itself seen from the same situation, as we have already demonstrated; and therefore the length of the image will bear the same proportion to the length of the object which it represents, as its distance from the eye, or vertex, is to that of the object; so that the longer the radius of the speculum which forms the image, the more distant, and consequently the longer will this image be, as compared with the object; and for the same reason, the nearer the object, the longer will its image be, until the situation is at the centre of concavity of the speculum, where the object and image will coincide, and appear of like magnitude, but in contrary positions.

This formation of the primary image being understood, we must in the next place consider it as a real microscopic object, placed somewhere between the face of the large speculum, and its centre of concavity, which situation will always depend on the distance of the real object itself, or, which is the same thing, on the degree of divergence of the incident rays coming from the object. Now if the small speculum were so placed as to have this primary image, or microscopic object, in its solar focal point, the rays coming from it would be reflected towards the large speculum in a parallel state; and passing through the central opening of the large speculum, would never converge so as to form a secondary image, in which case the conjugate focus would be said to be *infinite*: and if the said primary image were nearer to the small speculum than its solar focus, the reflected rays would diverge so as not to reach the central hole of the large speculum at all; but if the distance of the primary image *b e i* exceeds the solar focus of the small speculum *E F*, which is at the point *f*, then the reflected rays coming from the primary image will converge to a conjugate focus somewhere in the axis, and form a *secondary image*, the magnitude of which will increase with its distance from the primary image, which we now consider as a real microscopic object. The place where this secondary image will fall, will depend on the distance of the primary image from the solar focus of the small speculum; and a small change of this distance will cause a great corresponding change in the place of the secondary image, or conjugate focus; so that an adjustment for a small forward and backward motion of the small speculum, by means of a screw at the end of a long rod placed parallel to the tube, and reaching to the eye-end, will suffice for regulating the place where the secondary image shall most conveniently fall to be viewed by an eye-glass. The secondary image has its position reversed, as it regards the primary one, and is therefore in the same position as the object itself, or what is usually called *erect*, in opposition to *inverted*. This secondary image was originally made to fall within the tube, as at *k l*, in the focus of the eye-glass *G H*, through which it may be viewed by a small hole at *I*, where the visual angle

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G I H is now considerably enlarged. In order to explain the theory of this reflecting compound microscope, composed of the small speculum E F, and eye-glasses G H, more particularly, which we purposely omitted to do under the term MICROSCOPE, let us suppose a ray of light proceeding from the end *b* of the microscopic object, or primary image *l e i*, and falling on the central part of the small speculum at *g*, it will return reflected from this point, so that the angle of reflection on the other side of the axis or line *g e*, will be equal to the angle of incidence on this side, and will therefore return in the line *g e l*, to the place of the conjugate focus, where the point *b* will be depicted at *l*: also a ray coming from the point *i* of the same primary image, and falling on the point *g*, will be reflected in a similar manner along the line *g b k*, and will form the point *i*, at *k*, in the secondary image, which we have represented by a dotted line. Now as the primary and secondary images are subtended by the same angle *h g i*, or *k g l*, at the vertex *g* of the small speculum, agreeably to the laws of catoptrics, it is evident that the linear magnitudes of these two images will be directly as their respective distances from *g*, the vertex of the small speculum; therefore, as often as the distance *g b* is contained in the distance *g k*, or the distance *g i* in the distance *g l*; so often will the length of the secondary image *k l*, exceed the length of the primary one *b i*. But this secondary image *k l* is viewed through the eye-glasses G H, under the visual angle G I H, and is said to be again magnified thereby: let us next see what is the amount of this amplification; we have already said that an eye at the vertex *g* of the small speculum, would view both the primary and secondary images under the same visual angle *h g i* or *k g l*; but by an eye at I, the visual angle is G I H = *k K l*, because *l K* is parallel to *H l*, and *k K* to *G I*; and *k l* is the common subtense of both angles; consequently, as the distance *L K*, or focus of the eye-glasses G H, is to the distance of *L g*, or distance of the small speculum from the secondary image; so is the apparent magnitude of the secondary image, or visual angle to the eye at *g*, to the same with the eye at I; and if the distance *g L* be that at which an object may be best seen by the naked eye, the whole

power of magnifying of such microscope will be  $= \frac{g k}{g b} \times$

$\frac{g L}{K L}$ , provided that *b i* be considered as a real object under microscopic observation. But in a telescope, the size of *b i* has a reference to the distance of the object which it represents, and this circumstance must be taken into consideration in estimating the power of the Gregorian telescope. When the eye is placed at *o*, the vertex of the large speculum, we have said, that the object and its primary image are seen under the same visual angle; therefore, wherever the primary image may fall in the line of the axis, the angle *b o i* will be to the angle G I H, or *k K l*, as the object seen by the naked eye is to its secondary image, as seen through the eye-glasses, and consequently the latter, divided by the former, will give the power. But the visual angles *b o i* and *k K l*

are to each other in the compound ratio of  $\frac{o e}{e g} \times \frac{L g}{L K}$ , which formula, expressed in measured distances, will be more convenient for ascertaining the whole power of a Gregorian telescope, than the ratio of the visual angles, which would require previous calculation. For instance, let *o e*, the distance of the primary image from the great speculum, be given = 24 inches; and *e g*, the distance of the same from the small speculum, be = 3.3; also let *L g*, the distance of the

secondary image from the small speculum, be = 25.5, and *L K*, the focus of the eye-glasses, be = 2.3; then we shall have, agreeably to our formula,  $\frac{24}{3.3} \times \frac{25.5}{2.3}$ , or, which is the

same thing,  $\frac{24 \times 25.5}{3.3 \times 2.3} = \frac{612}{7.59} = 80.6$  for the power of

such a telescope, when directed to an object at such a distance as shall make the primary image fall as we have taken it. For objects very near, the focus of the large speculum will be long, and consequently the primary image will approach the small speculum as the distance decreases; for which reason, the magnifying power will increase with the diminution of distance, and *vice versa*; so that the power with parallel rays, or when the telescope is used for celestial purposes, will be the smallest possible, and yet this is what is usually called the power of the telescope, which circumstance shews the impropriety of taking the power of a large telescope from a measure of a near terrestrial distance, which mode has been practised by eminent astronomers, and recommended by men of science. If, however, a correction is applied for the want of parallelism in the incident rays, as we shall have occasion to do presently, then the power may be as accurately obtained at a short as at a long distance. In the old construction, which our *fig. 1.* represents, the piece of bent brass at *e*, which supports the small speculum, is acted on by the long rod *l C*, that has a milled nut at *l*, and a screw cut on the end *C*, that draws the projecting part *N*, of the piece *e*, along a slit made in the tube, while a contrivance in the cock *M* prevents the rod *M N* from advancing or receding as the rod revolves. Hence the eye-glasses G H remains fixed, and the adjustment for distinct vision is made by the rod *M N* moving the small speculum to its proper distance from the primary image *b i*; and in this way the secondary image may be made to rest in any given situation beyond or short of the point *L*, so that various eye-glasses may be used with the same specula in succession; or different small specula may be used with the same large one, from which changes a variety of powers may be had with fixed eye-glasses; but if the eye-glasses be inserted into a smaller sliding tube, there will be a third method of varying the power, by bringing the secondary image into the sliding tube out of the body of the large tube, so as to increase the distance *L g*, which is one of the factors of the dividend in our formula. Thus, whatever may be the arrangement of the specula, eye-glasses, and distance of the primary image, when any three out of the four terms of the formula are given, together with the whole power, the fourth may always be had by a simple calculation, which is a matter of great convenience to the maker. If, for example, we take the power 80.6 = *P*, and the radius of curvature of the large speculum = 48 inches, in which case the primary image with parallel incident rays will fall at  $\frac{48}{2} = 24$ ; and let *L g* and *e g* be respectively 25.5 and 3.3, to find the focus of the eye-glasses that shall produce such power; we shall have  $\frac{24 \times 25.5}{3.3 \times 80.6} = 2.3$  for the focus of the eye-glasses; or for the distance *e g* of the primary image from the small speculum, when the eye-glasses is given, we should have  $\frac{24 \times 25.5}{2.3 \times 80.6} = 3.3$ , as before. But it was soon found, that a single eye-glass not only produces fringes of colour near its edges, arising from the prismatic aberration of the rays coming from the secondary

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ary image, now considered as a real object, but that the field of view is thereby circumscribed into a small area. For these reasons, the Huygenian eye-piece, already explained, was substituted for the single eye-glass, which substitution left little more to be done, in the way of the improvement of the Gregorian telescope, except what related to the construction of the specula, which have now been brought nearly to a state of perfection, as we have explained, at some length, under our article SPECULUM. We have introduced *fig. 2.* for the purpose of explaining more clearly, than we could by a mere verbal description, the plan of the Gregorian telescope in its most improved state, in which, we repeat, the same letters indicate the same parts as in *fig. 1.* In this figure we have made the pencils of rays *ab* and *cd* to consist each of three lines, for the purpose of shewing how the image is formed at the points of convergence after reflection, and also how the inversion of the image is produced by the crossing of the pencils before they converge to a point at each end of the image. It may also be seen how the rays pass through the interior eye-glasses, before they form the secondary image between the two glasses, as in the achromatic astronomical telescope, thereby constituting this image a cata-dioptric one, which before was a catoptric one, according to our definition. The Huygenian eye-piece is peculiarly adapted for the Gregorian telescope; and when the specula have their curves so adapted as to counteract each other's aberrations, as we before recommended, and are also well polished, as well as of suitable metal, a very high power may be applied, and the light by reflection will be to that by refraction alone nearly as 5 : 8, where the apertures are equal; but as a reflector is capable of having a much greater aperture than any refractor that can be constructed, it will have a proportional advantage in the essential quality of illumination combined with power, on which union its excellence depends. It will not be necessary to repeat here what we have said above respecting the manner of determining a single eye-glass, equal in power to the combined eye-glasses in the Huygenian eye-tube; but it may be proper to mention here, that such a glass, when determined, must be substituted for the compound eye-piece, in computing the power of the telescope according to our preceding directions. The diaphragm that precludes the straggling and extraneous rays from coming to the eye is put where the secondary image is formed, and the aperture at the eye is obliged to be small in this construction of a telescope, to prevent any other light being admitted into the eye than what is reflected from the small speculum, and is necessary for the formation of the secondary image. When the diameter of the small speculum, and also the exact situation of the primary image, are known, the aperture at the eye, that shall admit the principal pencil, may be exactly determined by the subjoined analogy; *viz.* as the distance of the small mirror from the secondary image, is to the focal length of the nearest eye-glass; so is the diameter of the small speculum, to the necessary aperture at the eye. And to find the proper diameter of the small speculum, or central aperture of the large one, the proportion will be, as the distance of the primary image from the large speculum, is to its distance from the small one, with incident parallel rays; so is the diameter of the large speculum, to the diameter of the small one, or of its own central aperture; and when this proportion is preserved, all the reflected light will enter the small tube that contains the eye-glasses, and also the extraneous light not falling on the large speculum, if any, will be excluded. Lastly, should the field of view be required to be equal to a given visual angle, such as that subtended by the diameter of the sun, this will depend on the power of the instrument, which for this purpose must be

limited, as in the following example: let a reflecting Gregorian telescope of four inches diameter of the large speculum, and 17.5 inches focus, with a hole in the centre 1.1 diameter, (which is considered in practice a good proportion,) be required to have a field of view just 32', when the focus of the eye-glass is two inches? The thing required is, that the enlarged secondary image of the sun should just fill the aperture in the centre of the large speculum. The size of the primary image of the sun depends on the focal length of the large mirror, and must first be found: it has been ascertained that, in the focus of a speculum (or lens) of six inches focal length, the image of the sun is .05586 diameter, when he measures 32'; therefore, as it will be proportionably more in a longer focus, say as 6 : .05586 :: 17.5 : .1629; also, as often as this image .1629 is contained in 1.1, the diameter of the hole in the large speculum, which quotient is = 6.75; so much does the small speculum magnify the primary image, in converting it into a secondary one of 1.1 diameter. Again, if we divide the focus of the great speculum 17.5, by 6.75 - 1, we have 3.04, the distance of the primary image from the small speculum, which is somewhat more than its solar focus; and also if we divide 4, the diameter of the large speculum, by the same (6.75 - 1), we shall have .695 = the diameter of the sun's image on the face of the small metal, while the secondary image will just cover the hole of the large speculum, as required. Now, lastly, to find what is the power of the telescope under those limitations, we have  $17.5 \times 6.75 = 118$  for the first part of the

power; then  $\frac{118}{2} = 59 =$  the whole power, when 2 is the

focus of the single eye-glass. If the length of the focus of the principal speculum were increased to 30 inches, or even to 30 feet, while the aperture remains as before, no advantage would be gained in this construction from such length; for in the case of 30 inches focus, the primary image would be .2793, and the power of the small speculum only 3.93

$\left(\frac{1.1}{.2793}\right)$ , while the distance of the primary image from the

small speculum would be 10.24; the diameter of the image on the face of the small speculum 1.36; and the magnifying

power  $\frac{30 \times 3.93}{2} = 59$ , as before. There would, indeed, be

this disadvantage, that, as the small speculum has an increased radius here, its diameter will necessarily be so much augmented, as to intercept several of the best rays of light, which are those that fall near the centre. The opinion, consequently, that a Gregorian telescope will be improved by having a long focus of the great speculum, with the same aperture, is erroneous. When two reflecting telescopes perform alike, as to light and distinctness, the square square roots of the diameters of the specula must be as the cubes of their foci respectively. There can always be more power got by the small speculum and eye-glass, in even a short tube, than the aperture will bear.

The theory of Cassegrain's telescope is very similar to that of the Gregorian, the principal difference being that, in Cassegrain's, the small speculum is convex instead of concave. When the radii of the two specula and the eye-piece are respectively the same in each construction, the powers will be the same, though the apparent position of the last image, which we have shewn to be erect in the Gregorian, is inverted in the Cassegrainian construction; for on examining *fig. 3.* which explains the course of the rays in Cassegrain's telescope, it will be seen that the incident rays *ab* and *cd*, after being reflected from the large speculum,

are prevented from coming to a point at the *virtual* image *hi*, behind the small speculum, in consequence of its interposition, but are again reflected towards the eye in a state of less rapid convergence, till, falling on the lens *GH*, they are refracted to a focus at *L*, and form the *real* image *Kl*, which may be considered as the primary image, and is, therefore, not in the same position as the secondary image, which is formed in the Gregorian telescope after the rays have *crossed* each other. When the rays fall on the large speculum, they are reflected in a state of convergence towards the small speculum, because coming from a distant object; and they enter the tube either parallel or diverging, accordingly as the object is more or less distant; but they fall on the small speculum converging, so as not to become quite parallel after the second reflection, but slowly converging; and the quantity of convergence will depend on the distance of the *virtual*, or what may be called imaginary focus, or image *hi*, from the small speculum *EF*, which is here between *f*, the solar focus, and the convex speculum; whereas in the Gregorian instrument, the solar focus *f* is between the concave speculum and image *hi*. In both

constructions,  $\frac{oe}{eg} \times \frac{Lg}{LK}$  is the measure of the power;

and it is evident that the part  $\frac{Lg}{LK}$  is the same in both;

but it is not equally clear that  $\frac{oe}{eg}$  is the same, or in the

same ratio in both. The distance *og* between the two specula is less in Cassegrain's instrument than in the Gregorian, by twice the solar focus of the small speculum, and by so much may the principal tube be shorter; therefore, it remains to be proved that *ge* is to *go* in one telescope as *ge* is to *go* in the other, though differently posited. In order to prove this analogy, let *HD* (*Plac* XXVI. *fig.* 11.) be a concave speculum, and *EC* a convex one, both described with the same radius *CD*, and on the common axis *BCD*; and let the point *N* intersect the radius, so as to become the solar focus of each speculum, one really, and the other virtually. Let *F* be a radiant point, from which the ray *FH* is incident on the concave mirror at the point *H*, or to which the ray *KE* incident on the convex speculum is tending; then both these rays will be reflected from their respective specula to the same point *B* in the axis, and will pass in the same line *EB*. Again, let *CF* be an object, and the image thereof *ab*, formed by the concave, will be equal to the image *AB* made by the convex. This may be proved from our preceding theorems for convex and concave specula respectively, *viz.*  $\frac{dr}{2d+r} = f$ ,

and  $\frac{-dr}{2d-r}$ , or  $\frac{dr}{r-2d}$ , when all the signs are changed.

For as *d* = *FC*, *CB* = *f* in the convex; so in the concave, let *FD* =  $\frac{1}{2}$ , and *DB* =  $\frac{1}{2}$ ; and then we have in the former *d* : *f* :: *2d* + *r* : *r*, and in the latter  $\frac{1}{2}$  :  $\frac{1}{2}$  :: *r* - *2d* : *r*. But  $\frac{1}{2} = d + r$ , therefore  $2d = 2d + 2r$ , whence *r* - *2d* = *2d* + *r*; consequently *d* : *f* ::  $\frac{1}{2}$  :  $\frac{1}{2}$ , that is, *CF* : *CB* :: *DF* : *DB*; also the object and image are to each other in the same ratio with each speculum; and, therefore, since the object is the same in both, the image will be the same also, or *AB* = *ab*, which was to be proved. After having given this demonstration, it will be unnecessary to shew how the powers may be varied at pleasure, agreeably to the variation of the radii of the specula and lens, that compose the eye-piece, all which we have just explained

with regard to the Gregorian arrangement. As the instrument which is the subject of our present consideration inverts the objects to which it is directed, it is seldom used but in astronomical observations, for which it is peculiarly adapted, seeing that it is capable of having greater power, with the same length of tube, than any other telescope that has been yet invented; though with a terrestrial eye-piece, it might be used for the examination of terrestrial objects. While we are writing our present article, we have before us a Cassegrainian telescope by Tully, of 36 inches of tube, and  $6\frac{1}{2}$  aperture, that will shew Saturn or Jupiter, with their moons very well defined, with a power of 440; and that will distinctly define the words of a page in this Cyclopaedia, at the distance of 210 yards with a power of 295.

The maker of this instrument has constructed two pairs of telescopes, one of each pair a Gregorian, and the other a Cassegrainian, so as to match each other exactly in dimensions, powers, and quality of the metals and glass, in order to ascertain if one construction has any advantage over the other in quantity of light, under exactly the same circumstances; and though several scientific gentlemen, besides the author of this article, have examined and compared different objects as seen successively by each of the two telescopes of both pairs, yet not the least difference can be discerned by any observer. When the last glimmering of day-light remained, the vanishing object ceased to be visible with each like telescope at the same time, as nearly as could be ascertained, and that with both pairs, though they are constructed with dimensions greatly different the one pair from the other, and vary consequently in their powers and quantity of light. This experiment originated out of captain Kater's paper on this subject, which was published in the Philosophical Transactions of London, in the year 1813; and we have no hesitation in saying that the quantity of illumination is the same in both constructions, when the dimensions and qualities of the constituent parts are perfectly similar. Whatever may be the dispersion of light at the point of crossing of the rays, in the Gregorian construction, when the dispersed rays are returned from the second speculum, they are collected again, it should seem, *without loss*, certainly without apparent diminution of light. This conviction we put on record, not out of a spirit of controversy, but from a love of truth.

The first account that was published of the French reflecting telescope was in the fifth volume of the Philosophical Transactions of London, in the month of May, in the year 1672, almost immediately after the account of sir Isaac Newton's construction, which was given in the same volume; and a claim was set up by Cassegrain as to the priority of his contrivance, which, however, was not substantiated; nor was the matter of importance to determine, as the constructions are dissimilar, and as Dr. Gregory's instrument preceded both. The supposed advantages of Cassegrain's telescope over Newton's were stated to be these: *viz.* 1st. That the aperture was not limited to a confined number of rays incident on the large concave speculum; 2dly. That the reflection of the rays will be natural, since it is made upon the axis itself, and will therefore be more vivid; 3dly. That the vision will be more pleasing, when the face is screened from too much light by the broad end of the tube; and, 4thly. That there will be less difficulty in discovering objects with the eye facing them, than when turned from them. If these are advantages, they are, however, equally belonging to the Gregorian telescope; and we shall presently have occasion to state what was Newton's opinion on each of these points. In this, as in the Gregorian construction, the power can always be increased farther than the aperture will bear; and,

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and, therefore, an increase of focal distance of the large speculum, without a proportional increase of aperture, will answer no good purpose, but will render the tube unmanageable. When the aperture of a Cassegrainian or of a Gregorian telescope is to that of a Newtonian as 7.5 to 6, it has been proved that they have equal light with the same powers; the Newtonian having the advantage, in consequence of the obliquity of the angle of reflection of the small plain speculum.

Sir Isaac Newton's construction of the reflecting telescope differs from both the Scotch and French in this respect, that the large concave speculum is entire, and that the small one is quite plain, and placed at an angle of  $45^\circ$ , a little short of the focus; so that the converging rays come to a focus between the small speculum and the side of the tube near its superior end, as seen in *fig. 4.* of our last plate. Sir Isaac had discovered, in his experiments on reflected light, that more rays are reflected in an oblique than in a perpendicular direction; and that, consequently, there would be more light returned to the eye by a small speculum set at  $45^\circ$ , than would be if the angle of reflection were greater. In this instrument, the theory is much more simple than in either of the preceding instruments, on account of there being but one image, *h i*, formed by the incident rays *a b* and *c d*, after two reflections, one of which takes place at the large metal *B D*, and the other when the rays are in a state of convergence, at the small plain speculum *E F*; so that the whole length of the focal distance of the large metal *B D*, is  $B F + F e$ , or  $D E + E e$ ; and this distance, divided by the focal distance of the small eye-glass *G H*, reaching to *e*, gives the whole power. This calculation is as simple as in the astronomical refracting telescope above explained, and is analogous thereto. In the instrument first completed by Sir Isaac, the eye-glass was a plano-convex, with the plain face turned to the eye, and  $\frac{1}{4}$ th of an inch focus, while the focal distance of the large speculum was  $6\frac{1}{2}$  inches, and its

aperture  $1\frac{1}{2}$ ; hence its magnifying power was  $\frac{6.33}{.166}$ , or

$\frac{6\frac{1}{2}}{\frac{1}{8}} = 38$ . This was at the time considered a good proportion

between the power and aperture, and a table was constructed for different focal distances upon this radical proportion; but it would answer no purpose to copy this table at a time when the reflecting telescope, in every construction, is brought to nearly a state of perfection by the successive improvements of different artists. In this way of producing the image, the position is inverted; and the only mode of increasing the power with the same eye-glass, is by lengthening the tube and focus of the large speculum; or with the same large metal, by shortening the focus of the eye-glass. In this telescope, any of the eye-pieces, simple or compound, may be applied at pleasure: and if the large speculum be made of the best metal, of a proper parabolic figure, and with a good polish, the image will be sharp and well defined; and as there are no colorific rays in a separated state, the charge, or power of the eye-piece may be great in proportion to the focal length of the large metal, which is the distinguishing character of this construction, particularly when the small speculum is perfectly flat and well polished. The principal objection to this, as a portable instrument, is its unmanageable length, which was first given it by Hadley, who out of a pigmy made it a giant, and astonished the philosophic world. The length of the tube was made six feet, in which was included a metal of six inches aperture, and  $62\frac{1}{2}$  focus; and Newton's power of 38 was

increased to 230. See *Phil. Trans.* vol. xxxii. p. 303, or *Abr.* vi. p. 165.

In Sir Isaac Newton's reply to Cassegrain's claim of superior advantages, he states, first, that there will be more light lost by reflection from a small convex speculum, than from a plain speculum of an oval shape, and placed in an oblique position; secondly, that the convex speculum will not reflect the rays so truly as the plain one, unless it be of an hyperbolic figure, which is difficult to form, and even then will reflect only those rays truly which respect the axis; thirdly, that the errors of the convex surface will be augmented by the distance through which they pass before they reach the eye; fourthly, that the errors of the convex surface will be increased by the deflection or bending of the figure from the points where the incident rays ought to fall; fifthly, that on this account the figure is required to be more perfect than art can make it; sixthly, that the errors of the large metal, which is considered to be spherical, will be so augmented by reflection from the small convex metal, that indistinctness will ensue, such as will not allow either a great aperture, or a high charge; and lastly, that as the small metal contributes to increase the power, an over-charge of power, compared with the aperture and focal length of the large speculum, will be unavoidable, so as to produce very obscure and confused vision; for if the small metal be made with a larger radius, in order to diminish the power, too many of the incident rays will be intercepted; and if the charge of the eye-glass is diminished, the area of the field of view will be so far diminished, as to render a small object only visible, and that difficult to find. These might be objections a century and a half ago; but most of them have yielded to subsequent improvements in the nice art of casting, grinding, and polishing of specula, which we explained under the word *SPECULUM*, and in the formation and arrangement of the Huygenian eye-piece, which we have said is peculiarly suited to reflecting telescopes; though single lenses will do very well when the spectator confines the axis of his eye to coincide with the axis of the lens, so as not to produce distortion in the figure of the image viewed. It may be proper to mention further here, that the small telescope called the *finder*, attached to telescopes of considerable power, was first proposed by Sir Isaac Newton, to remedy the difficulty of finding the object with his reflecting telescope; and Descartes hath described it in his "*Dioptrics*" as answering the same purpose when applied to his best telescopes. Indeed objections well founded and rationally stated have led to various improvements in the mechanical arts, and are never to be disregarded, unless they are obviously futile. Had Sir Isaac Newton lived to have a peep at the instrument which next claims our attention, he would no doubt have been highly gratified at the progress which the art of constructing telescopes has made since his six-inch reflector, with its ball and socket, was mounted over a candle-stick, or a small pillar greatly resembling this domestic utensil! And yet, to do justice to his inventive genius, if we may apply figurative language to such a subject, the seeds of all the fruit that has since been matured were contained in his primitive little kernel; and we are proud to claim the Newtonian as the *Englisb* production.

"Though last not least," the Herschelian telescope now offers itself to our consideration, which we might with some propriety call the German telescope, inasmuch as the celebrated contriver of its stupendous mechanism is a native of Hanover: it was however constructed in England, and by English workmen, except so far as the ingenious knight of the Royal Hanoverian Guelphic order lent his

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powerful assistance, partly in the execution, but chiefly in the contrivance of the mechanical appendages. The work was immense, but royal means furnished the power that overcame every obstacle. In magnitude, as in power, the forty-foot reflector at Slough exceeds every instrument that human industry has yet put together, and stands as a proof of great mechanical skill directed by an enterprising mind. We trust that we cannot be understood to derogate from the merit of Dr. (now sir William) Herschel, when we state that the idea of giving a small degree of obliquity to the large speculum of a reflecting telescope, so as to bring the image formed in the focal point out of the body of the tube, at its aperture, originated with Le Maire (see *Machines Approuvées, par l'Acad. vi. p. 61.*) about the year 1728; for as we know not that this suggestion ever met the eye of this illustrious astronomer and mechanic, previously to his undertaking the Herculean labour of constructing a telescope with a speculum of forty feet focal distance, and four feet diameter, it would be unfair not to allow him the credit of the invention as well as of the construction. We mention the name of Maire in compliance with our system of tracing, or attempting to trace, from historical evidence, the origin of each mechanical invention that has contributed, immediately or remotely, to the promotion of the mechanic arts. The theory of this construction is easily explicable, by a reference to *fig. 5.* of our plate of the *Theory of Reflecting Telescopes*, in which, as before, A B C D is the tube, and B D the large speculum of the immense weight of 2118 lbs.; the incident rays *a b* and *c d*, which would have come back to a focus at the point *c*, in the centre of the aperture, if the axis of the speculum had coincided with the axis of the tube; in consequence of a small inclination of the speculum, given by screws behind, come to a focus near A, at the edge of the tube, where the image of the object is formed by only *one reflection*, which is the leading feature of the construction. This simplicity of principle is very convenient when a large aperture is wanted, because the head of the observer may be placed entirely at one edge of the tube, so as not to intercept any of the rays at the time of making an observation; but as the eye looks down the tube in every state of elevation, not only must the back be turned to the object viewed, but the observer must be mounted nearly as high as the superior end of the tube, in order to make his observations: hence various pulleys, ladders, scaffolds, &c. became necessary to enable the observer to adjust both the instrument, and at the same time his own position, all which will be best understood from the drawing, when we come to explain the particulars of the construction hereafter. The power of the Herschelian, as that of the Newtonian telescope, is obtained from the ratio between the focus of the speculum and the focus of the eye-glass, which in this instrument is not very short, though the image is formed by simple reflection. The mode of varying the power is the same, therefore, as in the Newtonian reflector, and requires no further explanation.

4. *The Construction of Telescopes.*—As we have now given both the *history* and *theory* of telescopes at considerable length, we shall not be under the necessity of dwelling long on each of the several constructions; particularly as a reference to the drawings which we have given, and which are mostly original, will exhibit to the eye more precise information on this part of our article, than any the minutest detail would do, unaccompanied by such visible representations. Now that the long *aerial* telescopes are no longer in use, we shall not fill our pages by describing the different kinds of mechanism that were applied for rendering them useful in observations,

by Huygens, Perrault, Sebastian, Mairan, and others; most of which are described in vols. i. v. and vi. of the "*Machines Approuvées par l'Academie, &c.*" to which we beg leave to refer the curious reader who wishes to know the particulars. All the supports for long telescopes had necessarily one property, which is desirable also in stands that are made for modern telescopes, but which is frequently neglected; and that is, that the object-end of the telescope was steadily supported by some point of rest near the remote extremity, where the rays were incident. Indeed various stands or mountings, as they are sometimes called, have been contrived for the convenient support of a telescope, when it is too heavy for the pocket, and incapable of sliding by concentric tubes into a portable form; but in every useful stand the following properties ought to combine: first, the instrument held by it should be kept firmly in its place, if of the refracting sort, so that the image may have no vibratory motion unfavourable to distinct vision, occasioned by an unsteady position of the object-glass; but if it be of the reflecting kind, then it should be so suspended, that tremulous motions arising from compactness of the materials, such as easily transmit vibratory impulses, may be avoided: secondly, a motion in azimuth, and another in altitude, are indispensable; and if the instrument be bulky, or have great power, in each of these respects there should be both a quick and a slow motion, the former to save time, and the latter for the sake of accuracy: thirdly, when the instrument is pointed to the required object, it should not be liable to be easily moved by any accidental touch of the observer's hand or body; unless it is managed in a state of suspension, as is the case with the larger reflectors: fourthly, the parts of the stand should be strong enough to bear the superincumbent weight, and not liable to get out of repair; and fifthly, its position should be in a situation not easily shaken, or moved by the observer's weight, or that of a bystander. When these properties are attended to, the exact shape and external appearance become matters of secondary consideration, and each artist may pursue his own schemes in the construction; but in this, as in several other departments of the mechanical arts, that work is best and quickest performed, which is done from approved patterns.

*Refracting.*—We will first describe the refracting telescopes represented in *Plate XXIX.*, and shall then proceed to the reflecting instruments contained in *Plates XXX.* and *XXXI.* of *Astronomical Instruments*, omitting those portable instruments that are in the hands of every reader, such as opera-glasses, &c. and that belong more properly to the head of *OPTICS.*

One of the best stands for a thirty-inch refractor, by which we always mean an *achromatic* refractor, is that exhibited in *Plate XXIX. fig. 1.*; in which A B is a tube of brass, mounted on the tripod stand of the same metal C D, and fixed by means of the screws Q and R. In the common construction, the horizontal motion is at C, at the top of the stem or cylinder, and the system of tubes F, E, P, is not applied, so that there is neither the slow adjustable motions, nor is the instrument steady in any given position; but here the horizontal motion is at D, at the lower extremity of the cylinder, where there is a long bearing for the pivot, with a tightening screw underneath the junction of the feet, and a clamp S to fix the instrument in any given direction. Also the handle in *fig. 5.* with a Hooke's joint, taking the squared axis of the screw at D, gives the slow motion in azimuth, while the sliding and adjustable tubes F, E, P, keep the angle of elevation unaltered. These tubes turn on a joint at P; and when a due elevation is given by the quick motion, occasioned

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fioned by the freedom of sliding, one within another, a clamping screw at E fixes them, and the slow motion produced by the screw F, finishes the observation in altitude, as the handle in *fig. 5.* does in azimuth; and both slow motions can be managed, one with each hand, at the same time. In the present representation, the celestial eye-piece H is screwed into its small tube, which bears a concealed rack, that is acted on by a pinion on the axis of the thumb-piece G, which may be made more or less tight by a screw in the middle of its plane, and which adjusts the eye-pieces for distinct vision. There may be any number of various celestial eye-pieces, but two or three are as many as are usually delivered with an instrument of this size. The object-glass screws into the mouth of the tube at B, and is so fixed by trial, that the most distinct view of an object is had when the screw is carried home, in which situation the receiving socket is fixed by the maker; so that unscrewing the object-glass at any time does not injure the instrument. The centre of motion in altitude is at a joint above C, and the steadiness of the tube A B will depend on the distance of this joint from the system of concentric tubes F, E, P, which may be more conveniently placed towards the eye-end than towards the object-end of the main tube, and with equal effect. When the cylindrical piece beyond the joint of the lowest tube at P, is withdrawn from its hole in a cock, attached to the vertical cylinder, the tubes will pack into one another, and the cylindrical end-piece will enter the hole of the cock T, under the main tube, and remain out of the way of injury, parallel to this tube. The tube I K, in *fig. 2.* screws at the end I, into the same place that the celestial eye-piece H now occupies, and is called the terrestrial tube, or terrestrial eye-piece, because objects are seen in their direct position through it, which through the celestial eye-piece are seen inverted. Near the end I, a pair of glasses, called the *field-glasses*, are screwed, and the end K contains the pair of glasses which is denominated the eye-piece. We have already shewn that these two pairs of glasses constitute an achromatic eye-piece, at the same time that they erect the inverted image formed by the object-glass in the small tube between H and A; and when this image is considered as a real object, then the terrestrial tube is a compound microscope of the best construction. This mode of describing the arrangement of glasses, it is presumed, will be more easily understood by those readers who understand the construction of a compound microscope, than any other explanation that can be given. The tube L, in *fig. 3.* is an open tube, which is sometimes made, by particular desire, to receive at its end L the eye-piece, now screwed into the tube I K at K; and then, as the empty tube L slides in the tube I K, the distance between the pair of field-glasses and pair of eye-glasses may be varied at pleasure; and as the magnifying power of the compound microscope varies directly with this distance, it is evident that the power of the telescope thus constructed will vary in like manner. But we have shewn above, that the power of the telescope may be varied also by varying either the pair of field-glasses, or the pair of eye-glasses; hence, when a great variety of powers is desired for the same instrument, different pairs of field and of eye-glasses may be adapted to the same terrestrial tube with very little additional expence; and in *fig. 4.* we have given three different pieces of short tube, containing male or female screws, or both, which are called *adapters*, by means of which the celestial eye-pieces may be adapted as eye-pieces to the terrestrial tube, so as to gain a great increase of power for particular purposes. When the adapter M, in *fig. 4.* which has both a male and female screw, is screwed into the end K, of the terrestrial tube in *fig. 2.* the celestial piece H, *fig. 1.* may be substituted for the pair of

eye-glasses belonging to this long tube, whenever occasion may require; or the pair of terrestrial eye-glasses may be made a celestial pair, on occasions when a low power and enlarged field are wanted. The adapter O, in *fig. 4.* has two dissimilar female screws, the smaller one of which screws upon the long tube at the end I, while the larger end receives the outer end of the celestial eye-piece H, in *fig. 1.* and converts it into a pair of field-glasses, for which it may be substituted, to get the greatest possible power, with a high magnifier also at the end K, or rather at L, with the sliding eye-tube; and in this way the power may be increased so much, that all light will disappear, and the instrument, consequently, will then become useless: but it is better to have additional pairs of proper field-glasses, than to substitute eye-glasses for this purpose, because the arrangement of the focal distances of the field-glasses is different from that of the eye-glasses, when they are arranged in the best manner, as we have explained under our last section. The adapter N has two male screws and a female screw, one of which male screws will fit the tube at H, *fig. 1.* and the other the tube at K, *fig. 2.* or L, *fig. 3.* and the female screw will receive Troughton's micrometer in either place, or any eye-piece having a mother-of-pearl micrometer, even though it may belong to another telescope. Thus the adapters, which are simple in their construction, of little expence, and very portable, afford a variety in the use of a telescope, that is at the same time both useful and entertaining; and we have been the more minute in our description of them, because they have never before been brought into public notice. The powers of this telescope usually vary from 25 to 100 without the adapters, as they are made by opticians; and opticians are no advocates for adapters that increase the powers too much; but for certain purposes the power may be augmented to about 120 with distinctness and tolerable light; but then it must be recollected, that the field of view will admit of only a small object, as well as little light, when the power is augmented out of due proportion.

*Fig. 6.* is a representation of a five-feet achromatic refractor, mounted in the most useful and convenient manner for making either celestial or terrestrial observations, and has all the appendages which we have just described as belonging to the thirty-inch refractor, when made in the best manner. A B, as before, denote the main tube, which has a diameter of  $4\frac{1}{2}$  inches; and instead of one set of sliding concentric tubes, here are two, inserted into the cocks P and P, of a three-legged stand of mahogany, of which two legs only are seen in the figure, and these shortened, so as to fall within the room allotted them in the plate. The construction of this stand has been described under the article *EQUATORIAL Stand*, with a reference to *fig. 5. Plate XIII.* of our present series of plates; therefore we shall satisfy ourselves with such a short description of the constituent parts here, as will simply enable the reader to understand their uses. The milled nuts Q and R, attach the main tube A B to the wooden stand; and the tubes A P and A P keep it steady from vibratory motion: the semi-circle of brass between Q and R, moveable about its centre, is racked at the concave part of its circumference, so as to fit the screw on the axis of the handle U, which we have made short, to avoid confusion in the figure; therefore, when the screw is pressed close into the notches of the rack-work, a revolution of the handle U, in either direction, will produce a corresponding motion, in elevation or depression, in the telescope borne by this semi-circle, while the vernier and divisions on the face of the semi-circle indicate the quantity of elevation, when zero is properly adjusted. The manner in which this mechanism acts, and also the method of

producing horizontal motion, will be best understood from an examination of *fig. 7*, in which the parts are enlarged, and in which the same letters denote the same things. The thumb-screw *V*, concealed in *fig. 6*, when turned round, presses on the fixed metal under it, and draws up the frame *Y*, of which one side is seen, that holds the axis of the screw *U*, and that turns on two pivots at its remote end *X*; and in this manner the screw is brought into contact with the notches of the racked semi-circle, or is detached from it by a contrary motion. In the former case there is a slow motion in altitude, and in the latter a quick one. Again, the axis *S*, of another horizontal and parallel screw, receives the handle, like *fig. 5*, for giving the motion in azimuth. This screw is also pressed into contact with a horizontal racked wheel, that lies fixed between *S* and *W*, and gives the slow motion. The screw of pressure is seen above *S*, and when the axis of the handle has its screw detached from the racked circle, the telescope is at liberty to have a quick motion in azimuth. The chamfered plate, on which the racked circle rests, is graduated, and the vernier at *W* reads the hours and minutes of time: but in order that this circle may be parallel to the equator in the heavens, so as to indicate time truly, it is necessary to turn the upper half, *C*, of the block half round, and to turn the whole stand so that the plane of the graduated circle may be parallel to the plane of the equator, which it will be when the upper point of the axis of motion is directed exactly to the north pole, in which situation the hour-circles will coincide with the horary circles of the heavens, or must be made so by an adjustment, which the graduated circle is capable of receiving, by means of an elongated hole, into which the screw enters that fixes it to the block. This block, we have said before, is called Smeaton's block, and answers the purpose of giving an equatorial motion to the telescope, when following a heavenly body by night, and is useful for finding one by day, from a knowledge of its right ascension and declination; for what was altitude in the horizontal position, becomes declination in the equatorial elevation. This telescope is one of the four of which we propose to exemplify the uses in conjunction with Troughton's micrometer; and therefore we have had the micrometer put into its place at *K*, when the terrestrial tube *I K* is used; but it might have been at *H* in place of the celestial eye-piece, where the value of the revolutions of the micrometer screw would have been as we have tabulated it in our last section. The two terrestrial eye-pieces in *fig. 8*, and one not given there, are made to screw into the terrestrial tube at *K*, in addition to all the four celestial eye-pieces, which have an adapter to fit them to the same place successively; which variety affords the choice of seven terrestrial powers with one pair of field-glasses; and as there are three pairs of field-glasses, the variety becomes  $3 \times 7 = 21$  different powers with a fixed eye-tube; but as the eye-tube also slides, the powers may be varied in small quantities at pleasure between the two extremes. In this instrument, the end *I* of the terrestrial tube does not screw into the celestial tube that bears the rack, but into an intermediate sliding-tube, which is here marked *H*, the use of which is to allow an adjustment for vision at very short distances, which adjustment requires a great length of tube to be drawn out. For the construction of Troughton's and other micrometers, we must refer to our article MICROMETER.

The screw *G* of adjustment for distinct vision, is concealed in our drawing by the *finder* or small telescope attached, over *A*, to the main tube, the use of which is to bring the object readily into the field of view of the large telescope; which is not an easy matter, when the power is great; for

as the field of view increases with a diminution of the power of the telescope, and *vice versa*, the small telescope saves much time in searching for any object that is visible in it. But the micrometer would be of little use in the night for measuring small angles, except when the moon is the object, unless some mode of illuminating the wires, or spider's lines, used in making the measurement could be adopted. Formerly this object was effected by a piece of brass, faced with card paper, attached to the object-end of the telescope, as in *fig. 15*, and turning on a pivot, *A*, to any angle of inclination or reclination that the position of a lamp, or candle, might require, of which the light was to be reflected into the tube; and an oval hole, in the middle of the reflecting plate, admitted the incident rays coming from the object to be viewed: this plan, however, is attended by the inconvenience, that either the lamp must be suspended by the object-end of the telescope, so as to rise and fall with it, or otherwise the angle of inclination or reclination of the reflecting piece must be altered in every new position. The first person who, we believe, laid aside this apparatus, and introduced a diagonal reflector into the body of the tube, was the Rev. Dr. Usher of Dublin, who brought the light within the axis of motion of his transit telescope, as is now commonly done; which method has the advantage of giving light in the same manner at all elevations, while the place, where the lamp is placed, never varies. (See the Transactions of the Royal Irish Academy, 1788, vol. ii. p. 13.) This method, however, was not considered as applicable to an ordinary telescope, where the axis of motion is below the tube; but Mr. Troughton has very lately applied this principle with success in the telescope before us, and in others of the same construction. At *Z*, over the centre of motion, a hole is made in the tube, of about one half the diameter of the tube, into which a covering cap of brass screws, when extraneous light is not wanted; then an elliptical plate of brass, rough gilt, with an elliptical hole in the middle, is reclined in an angle of  $45^\circ$ , within the main tube, in such a way as to receive the lateral light of a lamp or candle, which it reflects along the tube to the eye-piece of the micrometer; and the light thus reflected is not only mild and pleasant to the eye, but may be modified, as to quantity, by the position of the lamp, and will remain the same in all altitudes, if the lamp be in the same horizontal line with the reflector, and stand at a proper angle with the plane of the reflector. In using the telescope before us, we found that some of the rays falling on the extreme parts of the object-glasses were lost in the tube, and that consequently either the diaphragm was too small, or that the oval aperture of the inclined reflector was not sufficiently large; but the distinctness of the image is no doubt promoted by such exclusion: and, indeed, it is the practice of some opticians, when they find the longitudinal aberration arising from the spherical figure of the convex glass not well compensated by the concave one, to shut out the extreme rays on purpose, by the use of a small diaphragm, for which assertion we have Mr. Dollond's authority. In the instance before us, we have ascertained by a dynameter, that the reduction of the aperture is in the ratio 30 : 25.6, namely, from 4.5 to 3.84 inches: but our intention is to have the original aperture restored.

When a refracting telescope exceeds five or six feet in length, it requires to be supported at both ends, and then the nearer support must have adjustments for both altitude and azimuth, while the remote one may be a point of rest. *Fig. 8. Plate XXX.* shews a support for the eye-end of a long telescope, which we believe was contrived by Smeaton, and which answers its purpose sufficiently; *A B C D* is a mahogany

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mahogany light frame, four feet six inches high; the cross-piece, A B, is fifteen inches long, and the piece C D seven-teen, at the distance of eighteen from the other; another frame, E F G H, with parallel sides, nine inches apart, and more slender than the other frame, passes through the cross-bars of the former, in such way, as to have an easy motion; a cylinder or rod of brass is screwed by its head-piece to the cross-bar E F, and descends from M to N, through a wooden screw L O, which is hollow within, and cut into a screw round its circumference: this wooden screw terminates above with a brass socket and thumb-screw, which acts as a screw of pressure against the interior brass rod: the thick wooden piece L has a female screw, acting with the male screw of the hollow wooden cylinder L O, but is so made fast to the cross-bar A B, by a circular plate of brass above, that though it will turn round, it will neither ascend nor descend; consequently will produce an ascending or descending motion in the wooden cylindrical piece L O, and also in the brass rod M N, held by the screw K, attached to it. The concave piece of brass I has two motions in its stem, one horizontal, and the other vertical, like those in the stem of a small telescope, and receives the eye-end of a long telescope, to which it is screwed, while the remote end is supported by the branch of a tree, the block of a pulley, an opening in the roof of a house, or other elevated part of a building. The adjustments are thus managed; when the elevated end of the telescope is made to rest on its bearer, the eye-end adapts itself to the inclination by the joint in its stem under I; then the whole frame is turned to face the object, when the circular motion of the same small stem yields, and allows the long tube to remain quiet; and if the tube is not exactly pointed in azimuth to the object, the brass piece P, into which the stem I is made fast, slides along a groove made in the front face of the cross-bar E F, until the adjustment for azimuth is complete. This sliding motion, being manual, may be either quick or slow, as the observer desires; therefore, when a body in motion is once in the field of view, it may be followed without difficulty, by pushing the sliding-piece P in a proper direction. The quick and slow motions for adjustment in altitude are separate, and are thus produced; first the thumb-screw K is turned back, so as to let the rod M N ascend freely, till the altitude is nearly right, when it is fixed, and then the piece L is turned, backward or forward, as the case may require, with the right hand, while the left slowly slides the piece P, until the object is in the middle of the field; and when distinct vision has been properly obtained by the small tube at the eye-piece of the telescope, the pieces L and P, held respectively in each hand, will always afford the means of keeping the object in the proper part of the field; and though the support has but two legs, yet its connection with the support at the object-end, through the heavy tube of the telescope, will always keep it in its place when the adjustments are settled. It will not be necessary to describe any more stands, of which a great variety might be produced, that have been devised for refracting telescopes, because we presume that our readers will be able, after what we have said on this subject, to select such as may best suit their respective purposes.

We come now to describe the portable patent achromatic telescope, without a stand, that was invented by Dr. Brewster, and is sold under the patent by Mr. Harris, optician, in Holborn, London. The construction of this telescope, of which we have already explained the theory, is two-fold, and may be explained by *figs. 4. and 5. Plate XXX.* In *fig. 4.* the tubes are supposed to be transparent, or otherwise so divided, that the interior parts may be seen in their respective situations; A B C D is the outermost tube, of ma-

hogany, with brass ends, containing an achromatic object-glass, A B, at its exterior end; E F G H is the next tube of brass, sliding smoothly into the mahogany one, without lateral shake, and may be called the second tube: into this tube the third tube I K screws; and in its turn receives the fourth, or terrestrial eye-tube L O, containing the pair of field-glasses L M, and pair of eye-glasses N O; all which tubes slide into the space of twelve inches, (including the cap,) to fit the pocket. The principal object-glass, A B, is an inch and seven-eighths in diameter, and has a solar focus of 18.5 inches; and if there were no other glasses but the four contained in the terrestrial, or fourth tube, this would be nothing more than an ordinary portable or pocket achromatic telescope: but at I, in the second tube, is screwed a second object-glass of the achromatic sort, the diameter of which is one inch and three-eighths, and its solar focus 14 inches. When the second tube, E F G H, is pushed into the wooden tube A B C D, the second object-glass, I, approaches the principal object-glass A B; and when the third tube, I K, is also pushed in, the two object-glasses come nearly in contact at the end A B of the telescope: in this situation, the compound focus of the two object-glasses, by

the theorem  $\frac{F \times f}{F + f}$  is about eight inches, which is the

shortest possible; and in this state of the tubes, when the eye-glasses are adjusted for distinct vision, the power is the smallest possible; but when all the tubes are drawn out, the distance between the object-glasses, and consequently the power, will be the greatest possible, because the converging rays coming from the principal object-glass A B, will have passed through one half of the tubes before they fall on the second object-glass, and undergo a second refraction, so as to come to a shortened focus. In every intermediate position of the object-glass I, the power of the telescope, that is, the compound focus of the two object-glasses, will be determined according to their intermediate distance, by the

theorem  $\frac{F \times f}{F + f - d}$ . Thus in every new position of the

second object-glass I, the telescope will have a new power, and these powers might be marked by a scale running lengthwise along the second and third tubes which separate the two object-glasses; but the inventor has made another use of this property, by converting it into an *optical micrometer*: he has fixed two parallel wires in the focus of the eye-piece, and also two points of metal, to include a larger angle, in a direction at right angles to the former; so that when one pair includes a horizontal angle, the other will include a vertical one; an experiment is then made by actual measurement, of a divided scale, placed at a measured distance, to ascertain what is the angle measured by the points in the eye-piece, when the object is seen between the parallel wires in each of the extreme positions of the second object-glass I, and strokes are marked accordingly, as the boundaries of the intended scale, the end of the next contiguous tube being the index; thus in the instrument before us, the extreme points or strokes of the scale *a b*, in *fig. 5.* measure 110' and 218' respectively, at an interval of 15½ inches; and as it has been determined, both from theory and practice, (see Dr. Brewster's *Treatise on New Philosophical Instruments*,) that the scale of measures is a scale of *equal parts*, these 15½ inches are divided into 108 (218 - 110) minute spaces, while each minute space is bisected into spaces of 30", which might again be bisected by the eye, if the adjustment for vision could be made so nicely as to admit of such estimation. Hence it is easy to conceive how this telescope will measure any angle subtended by a distant object of unknown dimen-

sions,

sions, between 110' and 218', within the accuracy of 30": it is also easy to conceive, that, the angle increasing as we approach an object, the same object may be made to fill the field between the measuring points in a new station, provided the distance between the two object-glasses be so altered, by trial and adjustments, that the exact power is found such as will command this condition, and the new angle at the second station will be indicated, as the old one was at the first; and when the distance between the stations is measured in a right line leading directly to or from the object, the difference of the angles will afford data for determining the distance of the object from either station. For example, supposing the tangents of small angles to be equal to the angles themselves, which they are very nearly, let us call the greater angle  $m$ , the smaller angle  $n$ , and the distance between the stations  $a$ ; then, as the distances of the object from each station will always be inversely as the measured angles, we have  $n : m$  (of the angles) for the ratio of the distances, and the real difference of the same distances by measurement of the interval; therefore, by one of the simplest

theorems in algebra, we have  $\frac{am}{m-n}$  = the greater distance,

and  $\frac{an}{m-n}$  = the smaller distance: thus, if we suppose the

first, or smaller angle = 46', and the second, or nearer = 68',

with the interval 120 feet, we shall have  $\frac{120 \times 68'}{68' - 46'} =$

$\frac{8106}{22} = 370.9$  for the greater distance,  $\frac{120 \times 46'}{68' - 46'} = \frac{5520}{22}$

= 250.9 for the smaller, and the difference, as before, 120.

But it will be seen in a subsequent section of our article, that to determine distances from small angles with great accuracy, the value of a single second ought not to be neglected; and that a correction for want of parallelism, at short distances, is necessary for obtaining the true angle, whenever that is wanted. The author, however, has shewn, that the correction in question will vary nearly with the varying length of the telescope, and will not affect the ratio of the angles measured, on which the respective distances depend; but this coincidence of the correction with the length or power of the telescope, does not obviate our objections where real measures of angles are required, and where extreme accuracy is necessary for the success of the operation. But we have said the construction is twofold: it is extremely difficult, if at all possible, to hold the telescope so steady without a stand, that the angle, contained between the two fixed points in the focus of the piece, can be measured with precision; and this difficulty probably led to the substitution of the divided object-glass, seen in fig. 6, and edgewise in fig. 7, for the second object-glass I, which we have described. If this divided object-glass, screwed into the second tube at I, had precisely the focal distance as the entire one, and had the centres of the semi-lenses brought exactly into contact, the same scale and the same mode of taking the measure of an angle, would apply with it as with the one we before denominated I; likewise the points in the eye-piece would be necessary. But to do away the use of such points, and to render the instrument equally useful without as with a stand, the second object-glass that we have now to describe, as constituting the second construction of the telescope, was divided in the centre diametrically, and had its centres removed from each other, so that each semi-lens forms a separate image of the object viewed. In this construction, two points may be fixed on in any object, and when the tubes are so drawn out, that point  $a$  in one image coincides with point  $b$  in the other,

as in Dollond's object-glass micrometer, then the angle subtended by a line connecting the points  $a$  and  $b$  will be indicated on the second scale, or scale  $cd$ , in fig. 5. This scale in our instrument begins with 11', and ends with 75'; so that the length of  $15\frac{1}{2}$  inches, being divided into 64 (75 - 11) spaces, admits of these minute spaces being subdivided into three of 20" each; and if the adjustment for distinct vision would allow these to be bisected by estimation, the smallest quantity to be measured would be 10" on this scale, which is indeed as small a quantity as the power of the telescope is capable of distinguishing; and therefore a longer scale would have been of no greater use. The peculiar advantage of this construction is, that, as in Hadley's sextant, a motion in the instrument does not injure the accuracy of the observation, or impede the operation of taking it, but affords the opportunity of re-examining the exactness of the apparent contact. Hence the use of this instrument affords a pleasing exercise, and the necessity of a stand is entirely obviated. We have the authority of Tulley, the only maker, to say, that his grace the duke of Wellington had one of these telescopes, with silver tubes, presented to him by a friend, and there is reason to infer, that his using it as a coming-up glass gave him the advantage of ascertaining, better than any of his staff, in what direction the enemy was moving on certain critical occasions. For when it is ascertained by observation, whether the angle subtended by a man in motion is increasing or diminishing, it is easy to infer whether the man is approaching or receding, though the exact measure of the angle be disregarded. And at sea it is equally easy to ascertain whether a ship is gaining or losing ground in a chase, when two points in a mast can be distinguished. When this patent telescope has the divided object-glass as the sliding one, the two images appear exactly similar to those in Dollond's divided object-glass micrometer, but the range of scale is much greater: if Dollond's has any advantage over this, it is, that the power of his telescope is usually greater, and that the measures taken at different stations do not depend on two adjustments of the tubes longitudinally, though it is necessary always to have distinct vision, when the edges of the images are brought into contact. We consider that neither of the constructions of the patent telescope, on its present scale, is competent to the measurement of distances from one station with sufficient accuracy; neither has it a range of scale sufficient to make it generally useful for all angles. The writer of this article has had the divided object-glass made to have their centres adjustable to different distances from each other, so as to be capable of measuring all small angles from 1' up to 75', and to be estimated by the same scale in the different positions, the value of the first and last positions of the tubes being determined experimentally for each position of the semi-lenses, and the marks for the positions being so made, that when the scale runs out in the first position of the semi-lenses, the same value shall begin the scale at their next position; and thus a succession of minutes is continued from unity to the extreme end of the scale at the last position of the glasses; consequently one such instrument is capable of doing as much as several instruments with different pairs of semi-lenses can do, when put in a fixed position according to the patent. But after all, the initial and final values of a scale of a given length must depend on the difference of the focal lengths of the principal and sliding object-glasses; and, therefore, to observe the nice variations in the diameter of the sun or moon, it would be desirable, that the whole scale should measure only about 5', viz. from 28' to 33'; and then, if the telescope had power enough, the subdivisions of the scale might ascend by single seconds. Indeed it is yet a defi-

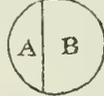
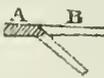
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desideratum in astronomical instruments to obtain an unobjectionable, and at the same time an easy method of measuring, by a micrometrical telescope, the distance between two very small stars, so near to each other as to be called *double stars*; for when so much extraneous light is admitted into the telescope as to shew the spider's lines, or scales of a mechanical micrometer, the minute stars vanish; and, when optical micrometers with double images are used, the light is so divided between the images, that the star also vanishes, in this case, from want of light. Dr. Maskelyne's prismatic micrometer is, perhaps, less liable to this objection than any other, but is not yet brought into common use.

Before we dismiss this part of our article, we beg leave to state, that about a hundred years ago, De la Hire contrived a method of giving different values to a pair of wires fixed in the focus of the principal object-glass of a telescope, by means of another moveable object-glass; and also that about the year 1771, Mr. James Watt, celebrated for his improvements on the steam-engine, not only contrived the same thing, but actually made the measurement by a longitudinal scale marked on his tube, nearly as done by Dr. Brewster. Mr. Watt's claim to *originality*, we believe, is undisputed, and may be proved both by his letter on the subject to Mr. Smeaton, written near that time, which letter is still in existence; and also from the circumstance of his having about the same time described his new instrument to the late Mr. Ramsden. With these prior inventions, however, we are well assured Dr. Brewster was not acquainted at the time of his taking out a patent, in conjunction with Mr. Harris, the present vender of the patent telescope; and therefore he also is entitled to the merit of *originality*; and moreover appears to have the sole right to the idea of converting it into a general micrometer, of applying it to the divided object-glasses, and of converting a Gregorian or Cassagrainian telescope into a micrometer, without any additional lens or mirror. Mr. Watt never made much use of this micrometrical telescope, the impression on his mind being, that the scale ought not rigidly to be a scale of equal parts, which Dr. Brewster has since demonstrated to be the case, and his line of business not leading him to finish all the adjustments for real use.

This ingenious gentleman had previously, *viz.* in the year 1770, constructed a micrometer, with a pair of parallel horizontal wires, crossed by a single wire at right angles, in the principal focus of an ordinary telescope, which acted as a micrometer for determining distances at one station thus; a twelve-foot rod had a circular disc of wood, eight inches in diameter, painted white, that was crossed by a red horizontal line of an inch in width, which disc was made to slide along the rod, while another similar disc was fixed fast about a foot above the ground, when the rod stood in a vertical position; then, at any unknown distance, the sliding disc was lowered till one wire of the telescope covered its red line, while the other wire covered the red line of the fixed disc; and then a scale upon the rod, graduated by experimental measures, indicated the *distance* by inspection to within  $\frac{1}{125}$  part of the whole. This instrument was used with a telescope of only twelve inches focal length, and an eye-glass of an inch and a half focus, so that the magnifying power was only eight times with this instrument. The survey of the intended canals of Crinan, Gilp, and Tarbert, was made by Mr. Watt in 1772, as well as the survey of the canal running from Inverness to Fort William, called the Caledonian canal, in 1773. This contrivance was shewn to several friends, and amongst them to Mr. Smeaton, though an account of it has never before been published. In the year 1778, a Mr. Green applied to the Society of Arts in the Adelphi for a premium for a similar

invention; on which occasion, Mr. Smeaton advised Mr. Watt to attend at the Society's rooms, to state the *priority of his claim*, which was accordingly done; but as Green's telescope had more magnifying power than Mr. Watt's, *viz.* 40, and was supposed on that account to be more accurate in determining distances, the claim of priority was ceded in Green's favour, and Mr. Watt's invention was suffered to go unnoticed by the Society.

A double-image micrometer was also invented by Mr. Watt in the year 1771, which, as it has never been described, we shall make no apology for introducing here, in company with his other ingenious inventions. This instrument consisted of a circular disc of glass, whose plane sides were not strictly parallel, but formed with each other an angle of one or two degrees, say a wedge or prism of one or two degrees. This disc or prism was cut by a diamond, at right angles to the slope of the prism, into two unequal segments thus;  The lesser piece, A, was fixed, while the larger piece, B, was moveable upon the diamond-cut line, as upon an axis or hinge, as seen in this plan, in which the dotted lines shew one of the positions into which B may be moved.  When the two segments remain in the same plane, they refract all the rays, which pass through them equally; but A remaining fixed, and B moving upon a centre, as drawn in dotted lines, the rays which pass through B, will be more refracted than those which pass through A, and this will vary with the angle which B makes with A. This divided prism being fixed in the focus of (or before) the object-glass of a telescope, two images are formed of every object by which its diameter may be measured. An index and divided sector of a circle serve to measure the comparative refractions. This instrument, however, has the fault, that the divisions are not equal parts for equal angles, and moreover the prisms would require to be achromatic, where high magnifying powers are required.

It was not till the year 1777, that the abbé Boscovich published an account of the prismatic micrometer of the abbé Rochon made of rock-crystal, with double refraction, and also of his own improvement, or substitution of glass prisms, where one of them revolved round an axis of motion like Mr. Watt's; nor was it till the same year that Dr. Maskelyne published his account of a prismatic micrometer, that measures a small angle by the refracting angle and the distance of the prisms from the focus of the object-glass conjointly; where the length of the telescope was the scale of measurement. See Phil. Transf. 1777.

*Reflecting.*—We proceed in the next place to describe the construction of reflecting telescopes. *Fig. 1. Plate XXX.* shews the figure of a reflecting telescope of either the Gregorian or Cassagrainian kind, for their external appearance and mode of using are the same, though we have shewn that their small specula are differently formed. After the minute description that we have given of the stands for achromatic reflecting telescopes, we may avoid prolixity, by giving a less minute account of those that have been appropriated to reflectors, where the uses of the same parts are the same: A B is the main tube of a reflecting telescope of moderate size, which may be either with or without a finder, as the power may require, mounted on the tripod G F; at A is the open aperture, and a little short of it, within, is the small speculum, drawn in or out by the screw C, which is connected with a longitudinal bar of metal, into which the heel-piece of the stem of the small speculum slides, so as to be taken away or put in at pleasure; within the interior end B of the large tube is the perforated large speculum, always concave, and of a proper figure to suit the face of the

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the small speculum. This large speculum is put in with some liberty, as is also the small one in a box containing a spiral spring acting against it to prevent tremors; B is the eye-piece of the Huygenian kind, of which there are usually two or three, according to the size of the instrument. The semi-circle D is racked, and the handle H turns the screw that gives elevation, while the handle I gives the horizontal motion, by its screw driving the racked horizontal plate E; both which are clearly seen in the figure. The vertical motion takes place at the centre of gravity of the tube at the top of the frame between E and D, and the horizontal motion is from an axis in the centre of the racked plate E, which axis has a long bearing down a tube to G, under the junction of the three legs. The three-barred bracing piece F has a joint at each leg, and also at the circular brass plate in the centre, so that a little force applied under this plate will raise it, and allow the legs to come together into contact, as well as the three arms that keep the legs open when the stand is used. This mounting is very portable and steady, particularly when the tube is short, and is every way convenient for use, except that both the vertical and horizontal motions are slow motions, the former of which is tedious when a great change of altitude is wanted in a given time, but the latter is in some measure remedied by the portability of the stand, which may be easily turned altogether, to face any particular object.

When the length of the tube is three feet and upwards, and proportionably wide, *fig. 2.* represents a stand that is greatly to be preferred to that represented by *fig. 1.* We shall put the same letters of reference to the same parts, though there is a difference in the constructions that may require explanation. This stand was contrived and first made by Tulley, who, we understand, claims also the invention of the three-armed brace F, in *fig. 1.*, above described. The contriver has evidently contemplated all the requisites for a good construction, and has succeeded in the execution of his plan: A B, as before, is the main tube, B one of the eye-pieces, C the adjusting screw for distinct vision, hid in our drawing behind the tube; but in place of it is seen the finder, attached above the eye-end of the main tube. At D is a sliding-piece of metal with a cylindrical hole, through which the round rod H D passes, and to which it may be fixed, by the pressing screw D, in any given elevation; to this sliding-piece D, two rods D K, D K, are attached by two joints, and two other joints attach them below to the frame E K, so that these rods K, K, are at liberty to rise and fall as the tube is elevated or depressed, but not until the sliding-piece at D has moved along the rod H D. When the piece D is fixed to the rod by the screw of pressure, it forms a point of bearing for the tube at a distance from the centre of motion, which is at the centre of the tube's gravity above the frame of brass work, seen in the figure; thus the telescope is kept steady by two points of bearing in every degree of elevation, though these points will recede from each other gradually as the telescope is depressed towards an horizontal position. When the screw at D is turned back, the motion is sufficiently quick; but when it is fast, the slow motion is produced by the handle at H; for while this handle turns the rod, a screw cut on its interior end works in a fixed cock, near H, that has a female screw within it, and draws the sliding-piece and rod together towards the eye, and thus elevates the tube, while the joints of the rods K, allow a corresponding elevation in them; so that, without undoing the screw at D, a slow motion up or down is produced by merely turning the handle H, which motion, being free from jerks, is very pleasant. Between the brass frame bearing the telescope and the large wooden frame E F,

are three circular plates, the uppermost of which is attached to the brass frame, or may be laid to form the basis of it, and has an axis of steel fast in its centre; the second circular plate is racked at the concave edge all round, and has a circular hole in the centre, just large enough to receive the steel axis we have mentioned; the third circular plate forms the top of the wooden tripod, and has also a hole in its centre, just sufficient to admit the steel axis above described; but its diameter is somewhat less than the diameter of the racked plate next above it, so that a rim, made fast to the racked plate, furrounds it, in the manner of a box-lid; but there is no other fastening of these three plates together, than the pressure occasioned by the superincumbent weight of the telescope, and of its subjacent frame E K K: the axis, or screw, of the handle I is made fast to the uppermost plate of the said frame, and takes hold of the notches in the racked plate below it, so that when the telescope is turned round in azimuth, by a quick motion, it takes the frame under it, and also the racked circle, round along with it, while the stand or wooden four-footed frame E F stands quiescent; but when the quick motion is finished, the handle I is still in its place at the eye-end of the tube, and turning it round, will give the requisite slow motion; for turning the handle, in connection with the racked plate, turns the superincumbent frame and telescope, without any motion being given to the racked plate itself, which is now kept down to its place by simple pressure of its load above. The stand, or large wooden frame, is braced in all directions, as may be seen in the drawing, and might be advantageously made of cast-iron, as it is not contrived for the convenience of portability.

The best stand for the Newtonian telescope is that which is represented by *fig. 3.*, in which A is the elevated mouth of a seven-feet tube, and B the place of the large speculum, that reflects the rays of light back to the small diagonal plane metal near C, which, by a second reflection, brings them to a focus at the eye-piece below C, as seen in the drawing. Above C is the finder, the upper end of which has a small achromatic object-glass, and the lower end the eye-glass. The upper end of the tube rests on a support D, that is capable of being raised or lowered slowly by a pinion on the axis of the handle under D, while the lower end rests on the horizontal bar of the frame E F, that is suspended by a pulley over F; the four pivots *a, b, c,* and *d,* of the said frame, sliding in the open grooves, seen near those letters, in the main frame, keep the small frame in any given situation, and allow a free motion, first down the vertical, and then down the inclined pieces, that compose the main frame, as low as to G and H; and when the lower end of the tube has been depressed into this situation, the tube may have an elevation approaching towards the zenith: for not only is the upper end elevated by the handles at J for the quick, and at D for the slow motions; but the lower one is depressed by the handle at I, round which the cord is coiled, that goes round a fixed roller at K, and two others at L and M, before it embraces the pulley N, and is hooked to a pin at O, above the frame. The rest of the main frame is so clearly exhibited in the drawing, that no farther description of it is necessary. In some of the instruments of this construction, when the handle J is omitted, and a quicker motion in altitude is required, and also a greater elevation than can be given simply by the handle at D, the second square stem that carries the pinion of the handle is raised by hand, and kept to its elevation by means of a second rack, which is set at liberty by pressing a button at P, connected with the spring-catch of the rack, when this squared stem is lowered again, all which motions will be readily comprehended by

any person tolerably acquainted with the mechanism of rack-work. The quick motion in azimuth is given by sliding the lower end of the tube gently along the bar on which it rests, or by moving the whole frame, which moves on castors; but the slow motion is produced by the screw at D. It is scarcely necessary to add, that the eye of the observer is applied to the *side* of the tube near its mouth, when the finder has pointed the tube properly to its object. This stand was contrived by sir William Herschel, whose experience in the use of various stands directed him to prefer one that is not liable to propagate vibratory motion to the large speculum, and that has a point of support near the upper extremity of the tube. We have, however, seen a six-feet reflector very steadily supported on a frame similar to that exhibited in *fig. 2*; and the composer of the present article has a Cassegrainian telescope, with a three-feet tube, fixed between the cheeks of one of the doors of his observatory, which turns round with the moveable dome in azimuth, and which elevates in altitude on two pivots resting in the notches of a pair of brass plates let into the said cheeks; which mode of mounting is not only convenient for celestial observations, but is remarkably free from tremors, which advantage may be owing partly to steadiness of position, and partly to the mouth of the tube being nearly two feet advanced into the open air. If the dome had not a remarkably easy motion on three loose ebony balls, placed at equal distances, this mode of mounting a large telescope would not afford a slow adjustment for motion in azimuth, which it now does with facility.

It is always interesting to a man of science to know by what progressive steps a great undertaking is accomplished, as well as to learn under what impression the original idea was entertained of forming the plan of operations. When sir William Herschel, who was brought up a musician, resided as organist at Bath, the natural bent of his mind led him to cultivate the pleasing science of optics, and to study the theory of mechanics so far as to enable him to amuse himself with attempts to construct a reflecting telescope: his success, in an undertaking of considerable difficulty, increased with his endeavours to attain some degree of excellence; and though at first he was satisfied to pick a tolerable speculum out of some dozens at which he had laboured; yet, feeling that his experience began to give him facilities both in the contrivance and execution of his manipulations, he proceeded by degrees to construct specula of seven, ten, and even twenty feet focus of the Newtonian form, to the number of more than 400, besides several of the Gregorian kind: but as yet he was unacquainted with any certain practical method of giving a parabolic curve to the face of his metal; on which account he selected, by trial, such specula for use as he found most perfect in figure, and repolished the remainder. In all these operations there was much room for experimental observation, and the time was not expended in vain. To a mind like Herschel's, even a failure roused a feeling for a new enterprise; and it was no small step towards advancement, to have perceived the cause of unsuccessful measures: the object being attainable, the means were to be found by skilful perseverance. Nor were the labours of our optician to be confined to the formation of a speculum; his mechanical skill was directed to the contrivance and execution of various stands for telescopes of an unusual length; and in the year 1778, he produced that which is now usually applied to the Newtonian telescope, and which we have just described as represented by *Plate XXX. fig. 3*. By the year 1781, Herschel (best known by this title at that period) felt such confidence in

his improved methods of proceeding, that he erected a stand for a thirty-feet reflecting metal of 36 inches aperture, and succeeded in casting it; but to his mortification the metal cracked in the cooling. The disappointment attending this accident must have been severe, but did not damp the ardour of the mechanical adventurer, in which light, no doubt, the enterprising contriver was now viewed. A second melting of the same metal was immediately determined upon, and a furnace was constructed for the purpose, which unfortunately gave way, and the liquid metal blew up the pavement. The mortification consequent on this second accident only plunged our adventurer the deeper, that he might rise the higher in his next attempt. During an interval of some respite from optical and mechanical labours, the astronomer, however, was not asleep; and while observations were making on the rotations of the planets, with telescopes of the Newtonian form, of 7, 10, and 20 feet focal length, the little planet, at first supposed to be a comet, from its having a visible magnified disc, was discovered. This lucky event rekindled the optician's ardour, and at the same time introduced him to the notice of his majesty; who, by his liberal patronage, promoted the views of this amateur instrument-maker, and afforded facility to his future operations.

In the year 1782, a good twenty-feet reflector was finished with a large aperture, and mounted on the Herschelian stand for admitting of *front observations*, for which it is found very useful. The forty-feet telescope, or master-piece of mechanism, which is more immediately the object of our examination, was begun at Clay-Hall at the latter end of the year 1785, when, through the mediation of the president of the Royal Society, the support of regal munificence had been graciously promised; and, when the various portions of the bulky structure, which employed forty workmen of different denominations, had been removed to Slough, near Windsor, the foundation was begun, which was to be the site for the largest telescope that had ever been pointed to the heavenly regions. We will not detain our reader by describing the details of masonry, carpentry, and smith's work, which have occupied eighteen large plates, in the second part of vol. lxxxv. of the Philosophical Transactions, for their explanation, but describe so much of the instrument, and of its appendages, as are useful in making actual observations.

The best view for general representation of the Herschelian telescope, is that which has been given in plate 24. of the volume just named, which therefore we have copied into our *Plate XXXI. of Astronomical Instruments*, with some slight alterations arising out of subsequent improvements or curtailments of unnecessary appendages. This view, taken from a station to the south-west of the erection, represents the telescope elevated in the meridian line, and affords the means of seeing the front parts of the instrument, and of its numerous appendages; but does not allow the mechanism that supports the inferior end of the tube, and that gives motion in some of the adjustments, to be explained by a reference to their parts, and therefore must be comprehended from a verbal description. The foundation on which the frame-work of the forty-feet telescope is erected, consists of two concentric circles of brick-work, one 42 and the other 21 feet in diameter, both sunk  $2\frac{1}{2}$  feet under ground, and tapering from the breadth of 2 ft. 3 in. below, to 1 ft. 2 in. above, where they are capped with paving-stones of  $12\frac{1}{2}$  inches wide, and 3 thick. In the centre of these circles, is fixed fast into the ground by brick-work, and opposite braces of wood, a vertical beam, as a centre of motion, round which the whole structure may

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may have a circular motion in azimuth, the plane of the outer circle being made perfectly level. The platform that connects the different parts of the frame-work below, has three principal horizontal beams lying parallel to each other, and three others lying parallel, crossing the first at right angles, besides various bracing-beams, that tie the whole compactly together, by iron bolts passing through the places of crossing. In our drawing, the outer circle of brick-work and masonry is denoted by the letters A B, and the circumference of the platform of wood by C D: under each opposite end of the six main beams is fixed a roller, of six inches in diameter, and eight long, having each a strong iron frame bolted into the end of its respective beam; so that the outer circle has twelve rollers: but these were not sufficient to bear the whole at 21 feet from the centre of motion; therefore eight more rollers, nearly equidistant, were fixed to strong parts of the platform, so as to be borne by the inner circle of 21 feet diameter; and thus the whole platform, with its superstructure, is capable of making a revolution, when sufficient force is applied round the central vertical beam, that enters a hole at the junction of the two central main beams, and that ascends but a little way out of the ground. Six out of the twelve rollers of the outer circle are seen between A B, the brick-work, and C D, the circular edge of the platform, and the rest may be imagined, not only on the remainder of this circle, but also on the inner circle, which is concealed. In these rollers, it is of great importance that the axes of motion all point towards the central beam round which they carry the platform, and also that their diameters and frames be precisely of like dimensions, otherwise they will not bear alike on the basis of masonry. At twelve feet distance from, and all round this moveable platform, are fixed fast into the ground eight equidistant posts, to an opposite pair of which the ends of a long pliable rope are hooked, that give the motion in azimuth; which rope, being conducted over two separate pulleys, fixed upon the platform, at opposite sides of the centre, has its ends turned in the direction of tangents, that point in opposite directions to their respective posts. The middle part of the rope is made to pass round one of the spokes of a large wheel, carried by the platform, before it winds round the axle, so as to coil up both ends of the rope equally; which rope therefore pulls by both tangential ends alike, so as to apply an equal force at each opposite pulley, while the resistance of the posts produces the requisite motion, without a strain on the centre. This mechanism gives the operator a great mechanical advantage. That part of the platform C, which connects the extreme ends of the three longitudinal beams, over the rollers at A, is made strong, and is the support for a pair of double ladders, that are seen ascending to the summit of the whole frame-work, one on each side of the large tube E; and at D is another similar support for two other double ladders, which, ascending in like manner, meet the former ones, and cross into them in such a way, as to admit of being bolted together at the points of crossing. These ladders are propped by other shorter ladders, as seen in the figure, and some upright masts, of which one is seen erected over the roller at B, ascend in like manner, and afford the means of obtaining horizontal braces at different heights, all round the frame, except where the elevated end E of the telescope requires an opening to be left between the front ladders for its different degrees of elevation. The transverse beam F G, which lies horizontally over the crossings of the double ladders, and is bolted to them, receives the hooks of the different pulleys, which we shall shortly have occasion to describe, at the same time that it connects and braces together all the ladders at their upper extremities. These ladders are

each 49 feet 2 inches long, so that the height of the transverse beam F G must be  $\sqrt{49 \times 49 - 20 \times 20} = 45$  nearly, and will therefore admit of the long tube, of 40 feet in length, to be raised into a vertical position under it. Below the mouth of the large tube, a gallery H I, with its attached brackets K and L, rests upon the slopes of the interior halves of the double ladders, at K and L respectively, and may be made to slide up or down, into any state of elevation, by two systems of pulleys, and ropes going round the blocks hooked at the junction of each pair of ladders, to the transverse beam F G, as may be seen in the figure; and when this gallery is lowered to the landing of the pair of steps M, a party may be admitted into it to gratify their curiosity, the floor being 13 feet 6 inches by 6 feet  $1\frac{1}{2}$  inch, and palisaded on the front, as well as partly at both ends. The bases, or sliding parts of the brackets, are prevented from slipping aside by lateral rollers of brass, acting against the straight sides of the middle pole of each double ladder, while other rollers of the same metal, acting under them, diminish their friction, when drawn up or let down by the pulleys. In the framing of these brackets, it was necessary to introduce contrivances for allowing some deviation of the gallery from an exact level, in case one of the brackets was elevated by its pulley faster than the other; which contrivances are not easily described without a reference to the drawings of the separate parts in the original account, or without inspection of the parts themselves.

The tube of the telescope, which is 39 feet 4 inches in length, and 4 feet 10 inches in diameter, is made entirely of iron; it having been ascertained that a wooden tube would have exceeded an iron one in weight by at least 3000 lbs. The sheets were first put together by a kind of seaming, that requires no rivets; and when the sides of the iron platform were cut straight, it was lifted by proper tackle into a hollow gutter, and then brought gradually, by various tools, into a cylindrical form. Various hoops are fixed within the tube, and longitudinal bars of iron, connecting some of them, were attached to the two ends of the tube, by way of bracing the sheets, and keeping the shape perfect when the pulleys are applied to give the necessary elevation at the upper end, and that the speculum might be kept secure in its bed at the lower end. The hoop by which the upper end of the tube is suspended is eight inches broad, and thicker than the rest; and the system of three pulleys, seen at N, with each a double block, has a corresponding set at O, hooked to the transverse pole G F; and the bars to which the blocks are hooked are so bent, that the moving ropes will not come in contact; nor will the elevated tube have its vertical motion disturbed by the tackle, either in ascending or descending, which was an important precaution. The lower end of the tube is firmly supported on rollers, that are capable of being moved forwards or backwards by a double rack, moved by wheels and pinions at R, which we shall not attempt to describe minutely; but the use of which every mechanic will comprehend without particular explanation. Originally there were several appendages near the mouth of the tube sliding by pulleys, or fixed to the tube, for the purpose of regulating the sweeps taken by this instrument; but as the twenty-foot reflector is now used for this purpose, they are taken off, and have been omitted in our drawing. By an adjustment at the lower extremity of the tube, the speculum is turned to a small inclination, so that the line of collimation is not coincident with the longitudinal axis of the tube, but crosses the tube diagonally, and meets the eye in the air, at about two inches from the edge of the tube. Hence no part of the head intercepts the incident rays, and the observation

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tion is taken with the face looking at the speculum, or by what the author has called, by way of distinction, the *front view*, the back being always turned to the object to be viewed. Besides the pulleys of elevation, and of azimuthal motion, there are others for the purpose of communication, as well as speaking-pipes, repeating-bells, and signals by clock-work, which cannot be clearly comprehended without inspection, or numerous drawings to be referred to; but the dexterity of the observer has rendered some of these superfluous. The large speculum is enclosed in a strong iron ring, braced across with bars of iron, and an enclosure of iron and tin sheets makes a case for it; it is lifted by three handles of iron attached to the sides of the ring, and is put into and taken out of its proper place by the help of a moveable crane, running on a carriage, which operation of course requires great care. Three small vanes attached to the edge of the tube at the mouth, assist to put the line of collimation right, when they are seen reflected from the speculum to the eye-piece. We visited Slough lately, with a view of examining all the minutiae of the stupendous apparatus that is rendered necessary for the management of this huge telescope, and that can only be well described on the spot, and found the substance of a letter written by the late Mr. Smeaton on this subject, immediately after a visit for the express purpose of inspecting the apparatus then in existence, so accurate, that we avail ourselves of this source of information; and as the letter which is before us is a copy taken from the writer's own manuscript, we have no doubt of its authenticity. It relates however principally to the twenty-feet instrument.

Gray's Inn, Nov. 4th, 1785.

" My dear friend,

" Since my last, I have been to pay my visit to Mr. Herschel, and according to my promise, proceed to give you some account of what I have seen; and indeed he has so much originality about him, as well as natural ingenuity, accompanied with great readiness and dexterity, that to enter into the detail would be far to exceed the bounds of a letter; I will therefore enter into the great outlines, and fill up as I can. You must know that, till this visit, I have held the doctrine about telescopes that I believe is the common one; that, having fixed upon a proportion that you by experience find to do well in any one species of telescope, what you are to expect from any other size of the same species, is in proportion to the square root of the length; so that increasing the length four times, your telescope will allow you to take an image of double the diameter; every point of it being illuminated with the same quantity of light, and painted with an equal degree of distinctness and precision. This idea and expectation I carried with me to Thornhill, and carried the same to Clay-Hall; but I did not bring it back with me. Mr. Herschel's doctrine will illustrate his pursuits better than minute descriptions. Whatever his doctrine originally was, experience has taught him that large surfaces of speculums are not to be ground and polished so as to preserve so accurate a figure as those of a small or moderate size; he therefore divides the maximum that telescopes may be expected to bring out, into three distinct classes; first, the greatest possible degree of magnifying power, where there is a sufficiency of light; secondly, the greatest degree of distinctness, where there is also a sufficiency of light, but where the natural size of the object does not require the greatest degree of magnifying power; thirdly, the greatest degree of light, where the objects are naturally obscure, which will afford discoveries that cannot be brought out either by great degrees of magnifying power,

or a capacity of distinctness, where, on these accounts, a sufficiency of light is wanting. In conformity with this doctrine, his principal discoveries have been made upon the stars, where the greatest degree of magnifying powers have been required, and used with his original telescope of seven feet focal length, which he has pushed to between six and seven thousand times. The greatest discoveries have also been made with these, where the greatest distinctness has been required, and a moderate degree of magnifying power; the diameter of the speculum of this telescope being no more than  $6\frac{1}{2}$  inches: and also, for the same purpose, he finds his ten-feet telescopes applicable, the diameter being 9 inches; but for objects naturally obscure, he can distinctly see an object with his twenty-feet telescope the diameter 19 inches, (which is seldom charged with a magnifying power of more than 200 times,) which the others will not reach. With this telescope he is now and has been for some time past at work, as he calls it, *sweeping* the heavens. The whole apparatus can upon occasion be turned to any azimuth, but is chiefly used with the telescope turning in the plane of the meridian. The inferior or speculum end of the tube is supported immediately upon the ground; the other end of the tube is raised and lowered by a tackle, supported at top upon a double equilateral triangle (or thereabouts); the observer is also hoisted up in a chair, that works on rollers, upon the inclined legs of the triangle next the eye-glass; and the eye-glass is brought to answer to this straight line by sliding the butt of the telescope near the centre of the whole machine; and by the same means it can be put into a vertical position. The raising the chair and the sliding of the butt are done by separate tackles respectively, touched only occasionally; but the main tackle that raises the telescope, when brought to its intended elevation, that is, polar distance, is worked by a distinct motion, that causes it to rise and fall alternately through a space of two degrees of the meridian, which being done with some degree of briskness, a plot in the heavens is examined at once of two degrees broad, the motion of the heavens in AR bringing on the objects in succession. By way of register, large sheets of paper are prepared, marked and numbered, being ruled into parallel long and cross lines at a quarter of an inch distance; a small square of this kind representing a quarter of a degree in AR and declination: all those that are examined being marked with a cross, and those that have been seen, but not fully examined, with a stroke one way; and when afterwards seen to satisfaction, the cross is completed. The place and species of the object are also marked upon the paper. In this operation, three persons are concerned; a labourer works continually the handle backwards and forwards for performing the destined range; and in this he is prevented from ranging too little or too much, by a small piece of machinery, that strikes a bell at each end of the range; he also stops on notice: and if any thing comes requiring this notice, and the object to be pursued, the telescope can by an apparatus, which occasionally heaves it from its meridian bearing, pursue it in right ascension for near a quarter of an hour; and that there may be no need for the observer's eye to be taken from the eye-glass, an assistant (Mr. Herschel's sister) sits in an adjacent room with the squared sheet before her, who notes down and in a book writes what is dictated. The time she has by the clock facing her, and the polar distance by a piece of machinery, which continually shews the degree and minute, and is worked by a string actuated by the telescope in rising and falling, which comes into the room, and winding round a barrel, performs the requisite motions. The telescope is set to its

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altitude by a small quadrant fixed over it, and the correspondent index is regulated answerable to the stretching of the cord of communication, by observing the first known star that passes of Flamsteed's catalogue. By this means, what has been done and what is to do is distinctly seen by the sheets. In this way, many hundred nebulae have been discovered, not only unknown before, but which no ordinary telescopes will reach. The speculum of the great telescope of 40 feet is cast, but was not got home; it is four feet diameter, and about 1050 lbs. weight. Mr. Herschel tells me there is a warehouse in Thames-street, where they keep for sale metal ready made into ingots, of which they have two sorts, what they call white metal and bell-metal; I suppose such as the bells of clocks are made of, but he did not know exactly their composition: for his speculum, they put two ingots of bell-metal to one of white metal. He thinks it a lower metal than what he used for his former specula of 19 inches, viz.  $7\frac{3}{4}$  ounces of tin, to 20 ounces of copper. I am not sure, however, whether I remember right, but you probably will guess. He does not propose it to magnify more than the present one of 19 inches, but to take the whole advantage in light, he makes all his specula flat upon the back side. The thickness of this last great one at the edge was to have been two inches, but by some shrinking in the mould, and particularly in the middle, I understand it is not there above  $1\frac{1}{2}$  inch, and also less at the edge than it was to have been, so that it is hollow in the back as well as face; but as it came pretty well upon the face, he promises to make use of it; and when he has got thus furnished, he promises to cast another, having duplicates of all he makes, so that while one is in use, another can go to the polisher. They are made to be enclosed in brass boxes, and their weight lays simply upon several thicknesses of cloth, and are polished in these boxes, and are made to go in and take out so conveniently, that they are very frequently put into their tubes and tried with an object while under the operation of polishing; and to these frequent trials he ascribes the principal cause of his success in these operations.

\* \* \* \* \*

I remain, dear sir,  
ever your's,  
J. Smeaton.

We have only to add farther, on this subject, what we learnt in a conversation with sir William Herschel, that he prefers single lenses, before what are called achromatic eye-pieces, from an idea that more light is thus had for both his 20 and 40 feet reflectors, and that greater power may thus be obtained for his smaller instruments. We have, however, to regret, that his mode of giving the parabolic curve to the great speculum, by mechanical means, must for the present remain a *secret*, for the disclosure of which we feel that we have no right to ask, while there is an existing manufactory that might be injured thereby. The peculiar advantage of the Herschelian construction is, that there is no light lost by a *second reflection*, and that the large quantity of polished surface reflects more rays than can be collected by any other means. The weight of the metal, which is very brittle when of the best mixture, made it necessary to have a prevailing portion of copper in the large speculum, which is, therefore, liable to be the sooner tarnished, and to require more frequent polishing than would have been requisite, if the best proportion for brightness could have been preserved in the ingredients of the compound metal: but what is defective in quality, is compensated by the quantity of polished surface. It is hardly necessary to inform the practical astronomer, that when the

greatest powers are used, both the light and the field of view, and consequent time of apparent passage through the field, are proportionably diminished. We understood the ingenious and dextrous observer to say, that instruction and practice are necessary to enable any other person to follow a star or planet with the forty-foot reflector; for that a heavenly body seen with one of the highest powers does not continue in the field more than a few *seconds* of time, unless the motion of the tube is regulated so as to keep pace with the apparent motion of the body; and this is probably the reason why few persons have been in a situation to form an estimate of the merits of this transcendent instrument. For the detail of all the parts, see vol. lxxxv. of the *Philos. Transf. of London*, part ii. 1795.

5. *On the Powers, &c.*—After having described the most convenient constructions of a telescope, of both the dioptric and cata-dioptric kinds, we proposed to shew how their powers may be practically varied and estimated. We have already seen, in our section on the theory of telescopes, how the powers may be calculated, when the focal distances of the glasses are known. In telescopes with one object-glass, or concave speculum, and one eye-glass, the solar foci of which may be called  $F$  and  $f$  respectively, the power  $P$  may

be always expressed by  $\frac{F}{f}$ ; but  $F$  varies inversely with the

distance of an object viewed, while  $f$  remains the same, therefore the power  $P$  will vary also inversely with the distance. So long ago as in the year 1740, Benjamin Martin, to whose ingenuity the practical opticians of the present day are much indebted, proposed to determine distances at one station by this *variation of power* in a long telescope; but as the distance increased, the proportional elongated portion of the sliding tube containing the eye-glasses became so small, that the scale was too limited to be of any real use. We mention this circumstance, merely to shew that the same telescope with the same glasses has its powers naturally varying with the distance, but in an inverse ratio, until the incident rays become parallel in consequence of the great distance of the radiant object; hence we may account for the reason why the famous Short attributed to his telescopes powers which they did not possess, when directed to very distant objects. But, generally speaking, when we say that a telescope magnifies fifty times, we are understood to mean, that it enlarges the diameter of the sun, or of some *distant* object, so many times; because in this case  $F$  and  $f$  remain both unaltered. (See *LENS*, 5.) But when the object viewed is at no great distance, calling the elongated portion of the solar focus  $e$ , and the distance  $d$ , Martin has shewn that

$e : F :: F + e : d$ , or that  $\frac{F + e \times F}{e} = d$ ; and he pro-

posed to determine the quantity of  $e$  in all situations by mechanical measurement. Now supposing the power to be considered as always determined from the solar focus of an object-glass or speculum, in telescopes of the simplest construction, this power, where the object-glass or speculum remains the same, can be increased only by shortening the focus of the eye-glass or eye-piece, when it is composed of two glasses; but there is a limit in the power of dioptric telescopes constructed with single object-glasses, which depends on the prismatic and spherical aberrations, beyond which limit *indistinctness* takes place; and even in good achromatic and reflecting telescopes, the eye-piece may be shortened until a deficiency of light renders the increased power of little use, and thus fixes a limit to useful power.

After a power is fixed on, in the use of a simple telescope,

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scope, such as admits of sufficient light, and allows a field of view large enough to contain the images of the object to be examined, the magnitude of this power may be ascertained by different means, besides  $\frac{F}{f}$ , which expression is better cal-

culated to explain the theory than to define the practical result; for it is not an easy matter to measure precisely the *exact* compound solar focus of an eye-piece composed of two glasses, nor yet that of a single lens, when its focus is short, and consequently its substance considerable in thickness. Neither is it easy to obtain the *exact power* of a terrestrial eye-tube constructed on the principles of a compound microscope. The first practical method of measuring the total power of a telescope, that we shall describe, is extremely simple, and is applicable to telescopes of all constructions, however complex the calculation by theory may be, and gives the result with very little trouble. Whatever be the diameter of the object-glass or speculum of a telescope, in inches and parts, the diameter of its image, or luminous disc, formed in the anterior focus of the eye-piece, by the condensed rays, will bear the same proportion to that diameter, as the focal length of the eye-glass or glasses jointly, bears to the focal length of the object-glass or speculum; these diameters, therefore, may be substituted for the two foci of the respective glasses, or speculum and its eye-glass, in determining the power. Different methods of measuring the luminous disc have been proposed; a nicely divided slip of mother-of-pearl, fixed in a small piece of tube bearing a magnifier at the opposite end, forms a simple instrument, which has been called the pearl dynameter, (from δύναμις, of power, and μέτρον, a measure,) and which answers the purpose very conveniently, when sliding within another short tube for the sake of adjustment, as is seen in fig. 9. Plate XXIX.

Suppose that the disc of a telescope, with an object-glass of 3.25 inches diameter, measures  $\frac{1}{250} = \frac{1}{1000}$  of an inch by

the pearl dynameter, then  $\frac{3.25}{.06} = 54\frac{1}{2}$  is the power required

to be measured: and if the same disc had been measured with a reflecting telescope of 7.5 inches diameter of the large speculum, whatever its construction in other respects,

the power would have been  $\frac{7.5}{.06} = 125$ . The correctness of

this simple method will depend on the accuracy with which the respective diameters of the disc and object-glass, or speculum, are taken, and the distance to which the telescope is adjusted for distinct vision. The powers of the four achromatic telescopes, for which we have adapted our Tables I. and II. in the next section, were taken in this way, when Troughton's micrometer was applied as a celestial eye-piece, and were determined to be as follow: viz.

In.		
30.15	focus	$\left\{ \frac{2.05}{.0663} = 30.5 = \text{power.} \right.$
45.75	ditto	$\left\{ \frac{3.3}{.077} = 45.3 = \text{ditto.} \right.$
63.5	ditto	$\left\{ \frac{3.5}{.0512} = 63.5 = \text{ditto.} \right.$
118.8	ditto	$\left\{ \frac{3.000}{.052} = 120.0 = \text{ditto.} \right.$

These powers, if the data had been taken with perfect accuracy, would have been respectively to each other as the focal lengths of the object-glasses directly, which they are nearly, or inversely as the values of the micrometrical screw, which values have been tabulated, as will be seen in our

subsequent section; therefore, when the power of one of the telescopes is obtained accurately by the pearl dynameter, the powers of all the others may be had from the micrometrical values, by reciprocal proportion. Before, however, the dynameter is used, it will be necessary to adjust the eye-piece to distinct vision when viewing a remote object, otherwise the disc will be too small, and the power larger than when celestial observations are taken. Also, to avoid miltaking the anterior glass of the eye-piece for the disc or diminished image of the object-glass, a slip of paper may be stuck on the centre of the exterior face of the object-glass, the image of which will appear on the centre of the disc, and assist the adjustment of the dynameter to its true place of distinct vision, which is essential at the moment of taking the exact measure of the disc. If one of the celestial eye-pieces has got a divided slip of pearl, as recommended by Cavallo, to be used as a micrometer, the interior lens may be taken out, and then the eye-piece will become a dynameter for measuring the powers of all the other eye-pieces, whether celestial or terrestrial, in the way we have here described; but it will be more convenient to use one with a sliding tube of adjustment for distance, as made by T. Jones, of Charing-Cross.

As this dynameter has lately been constructed in an improved manner, by the maker we have just named, and as it has never been described, we will here give our readers a short account of its improved construction. Fig. 9. of Plate XXIX. represents this neat little instrument of nearly its full size, where *a*, *b*, and *c*, are so many small tubes within one another: the shortest tube, *a*, contains the two plano-convex lenses *f* and *g*, which constitute what we have called the positive, or Ramsden's eye-piece, with the two curved faces opposed to each other; and as this eye-piece screws into the tube *b*, near the end *g*, it may be considered as a part of this tube, when screwed into its place: the tube *b* has a slip of the mother-of-pearl, *d d*, very delicately made, and screwed fast across a diaphragm near its remote end, at such a distance from the lens *g*, that the screw of the eye-piece *a* will adjust the pearl for distinct vision, as an object in the compound focus of the eye-piece, for any eye that may have occasion to use it. The slip of pearl is divided into such minute parts, that 500 of them are equal to an inch, and yet the eye-piece has power enough to give a clear view of them, and to enable the eye to count the dividing strokes, of which every fifth is of double, and every tenth of four times the length of the subdividing strokes. When the scale is rendered clearly visible and legible, by the screw of adjustment, the tube *b* is inserted into the outermost tube *c*, which has a diaphragm and covered hole at *e*, and when this hole is uncovered, tube *c* is brought into contact with the eye-piece of the telescope, centre to centre, so as to receive the pencil of condensed rays, that usually enters the eye of a spectator; then, if the image of the object-glass of the telescope formed at the place of the eye, is not well defined on the slip of pearl, tube *b* must be pushed into tube *c*, till this will be the case, and then the number of divisions and sub-divisions of the pearl scale, that the little luminous circle exactly covers, will give the measure required; and if the number read be *doubled*, because they are 500th parts of an inch, they will then be so many parts out of 1000, and will therefore be decimal parts of an inch; the denominator being considered = 1000.

Another method of ascertaining the powers of a telescope, when a dynameter is not at hand, is by what is called *false vision*, which requires a little practice before it can be applied with success. By this method, one eye views the magnified image of a distant object in the telescope; and the

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the other eye, being also used, but *out of* the telescope, projects that image upon a horizontal line, bounded by some observable distinct marks, that can be known again: then as often as the angle subtended at the place of observation by the object, of which the image was observed, is contained in the angle subtended by the horizontal line into which it was projected, so much does the image apparently exceed the object; *i. e.* so much does the telescope magnify. For instance, suppose that forty bricks in the wall of a distant building appeared just to occupy the whole field of view of any telescope, and that the angle subtended by those bricks measured 50', by any other instrument, which would be the case at the eighth of a mile very nearly; then suppose that the horizontal line covered by the forty magnified bricks, or by the luminous circle of the field of view, was bounded by two trees, and subtended an angle of 41° 40'; on these

suppositions, the power would be  $\frac{41^\circ 40'}{50'} = 50$ : and in

this way, but not so well as by the pearl dynameter, a telescope composed of any number of glasses, or specula and glasses, may have its power determined, without any regard to the radii of the glasses or specula, or to their respective positions. Should the results of the two methods accord, it may be taken for granted, that the determination arising from the average is sufficiently accurate. The powers of the four telescopes with the same eye-piece, which we have before mentioned, were taken again by this second method, and found to be as in the subjoined statement; *viz.*

In.		{	681'	
30.15 focus	-	{	22' = 30.9	
45.75 ditto	-	{	$\frac{681'}{14'.5} = 47.0$	
63.5 ditto	-	{	$\frac{681'}{10'.5} = 64.8$	
118.8 ditto	-	{	$\frac{681'}{5'.6} = 121.6$	

In taking these measures, it was found convenient to make use of the space included between the two spider's lines of Troughton's micrometer, instead of the whole field of view; which substitution not only prevented distortion, by confining the objects to the middle of the field of view, but diminished the angle to be projected within the dimensions of the pupil of the eye, so that the head did not require to be turned from its first position in making the projection. Two painted slaves were stuck into the ground at about 700 feet from the eye, at such a distance from each other, that they could both be seen within about one-half of the field of view; the spider's lines were then opened till they coincided with the two slaves, when projected upon them by false vision, and the value of the revolutions was then found to be as above stated. This was done with the telescope of 30.15 inches focus; but the same projection would have taken place at the same opening of the lines, with any of the other three telescopes at the same distance from the slaves; therefore it was not necessary to repeat this operation with the other telescopes, because the respective values of the same opening, or number of revolutions, are given in our Tables I. and II., as will be seen presently, for all the telescopes, as so many divisors for the common dividend. Thus Troughton's micrometer may be used with great advantage in determining the power of any telescope to which it is adapted; and even Cavallo's may be substituted for the same purpose, when that eye-piece is used to which it is appropriated. But the most convenient, as well as most ac-

curate dynameter that we have seen, is that which has an eye-glass divided, so as to form two images of the luminous disc, when the centres of the semi-lenses are separated by a screw with a divided head. This double-image dynameter was invented by Ramsden, probably soon after Dollond's object-glass micrometer was invented, and is now made by G. Dollond, and also, with some variation, by Thomas Jones, of Charing-Cross, who was a pupil of Ramsden's school. As this elegant and useful little instrument has not been described, we shall introduce a short account of it in this place. *Fig. 12. Plate XXIX. of Astronomical Instruments*, represents the exterior appearance of Mr. Dollond's construction, and *fig. 14.* its plan, when the covering plate is taken off; in both which figures the same letters refer to the same parts. The frame that contains the screw is denoted by *a*, and *b* is the interior or sliding-tube of brads, made fast to the said frame, having the divided lens at the eye-end, near the letter of reference *a* in *fig. 12*; and *c* is the outer tube, which is placed in contact with the outermost eye-glass of the telescope, when the luminous disc is to be measured, and admits of adjustment of the tube *b* to distinct vision of the disc: *d* is a milled head of a concealed screw, which separates the two semi-lenses until the luminous disc is seen double, with the opposite edge of each disc nearly in contact, as in *fig. 13*: *e* is the divided head of the screw, or micrometrical head, with 100 divisions properly numbered; and *f* is the scale for indicating the number of revolutions of the screw, as the divided head *e* does the parts of a revolution. The axis of this screw is made fast to the frame, so as not to move from its situation while it revolves, and is of bell-metal; it is made hollow within, and is tapped to a thread of the same fineness as that of the exterior screw; then a smaller screw of steel enters the tapped tube, as seen in *fig. 14*, and has its other end pinned fast to the piece of brads *g b*, at the point *g*, which piece carries one half of the divided lens, while the other half is carried by a similar piece, *b h*, to which the scale *f* is also screwed fast. The foot-piece of *b h* is tapped, so as to receive the thick screw of the axis; and a bent spring of metal, *i h*, bears against both pieces, *g b* and *b h*, so as to keep the screws connected with them free from shake. During this description of the concealed parts of the frame, the mechanical reader will have anticipated, that when the micrometer head, and nut *d*, made fast to the axis of the thick screw, turn together in the direction that makes the figures increase, the thick screw will draw the piece *b h*, and with it the scale *f*, and one semi-lens, towards the nut; but as the small screw of steel is a left-handed screw, *i. e.* has its thread winding in a contrary direction, and is fast to the piece *g b*, it will recede from the nut, and take the other semi-lens in a contrary direction, so that the centres of the semi-lens will separate with a velocity equal to the sum of the contrary motions of the two semi-lenses; and as these centres recede, the original disc will become a double disc, as in *fig. 13*, and may by separation be made two discs, when the semi-lenses are removed to their greatest distance. Hence, when the value of one revolution is known, the amount of any given number of revolutions and parts is had, as being multiples of that revolution. In the dynameter before us, there is a disc of thin horn or ivory, just  $\frac{1}{8}$ th of an inch in diameter, in the sliding-piece that closes the aperture of the exterior end of tube *c*; and five revolutions of the screw just divides this disc into two contiguous ones, so that each subdivision of the micrometer *e* is just  $\frac{1}{800}$ th of an inch, and when doubled, may be put down in decimal numbers. But there is another use of the horn disc, besides that of giving a value to the micrometer; it

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so much resembles the luminous disc formed by the image of the object-glass which is to be measured, that the mode of dividing this disc by the screw may be illustrative of the mode of application to the measurement of the actual disc formed with distinct vision, by the refracted rays that have passed through the eye-tube of a telescope.

This instrument forms, besides, a pleasing microscope not only for viewing, but for measuring too, the real dimensions of any microscopic object; and when applied to a nicely divided scale, it may be ascertained whether or not the horn disc is exactly  $\frac{1}{7}$ th of an inch in diameter; *viz.* whether or not five revolutions of the screw will bring the strokes that include  $\frac{1}{7}$ th of an inch into exact apparent coincidence; for if not, a correction depending on the excess or deficiency must be applied to all measures of a luminous disc, that are to determine the total power of any telescope; or otherwise the two lenses of the eye-piece must have their *distance* between them so adjusted, that five revolutions will exactly measure  $\frac{1}{7}$ th of an inch; for as the two semi-lenses, when brought to have their centres coincident, constitute one of the two lenses of a positive eye-piece, as in the pearl dynameter, and as in Troughton's micrometer, we have shewn that altering the distance between these lenses, will alter their compound focus, and consequently their magnifying power, on which the apparent magnitude of the luminous disc depends. In using this instrument, the eye is applied above the centre of the tube *b*, over *a* in *fig. 12*, and the tube *c* is used, as in the pearl dynameter, for adjustment for distinct vision of the discs.

When Ramsden first made the double-image dynameter, as now constructed by Mr. Dollond, and as we have here described it, he found that there was some play in the screws after they had been in use for some time, so that they would not immediately obey the direct and retrograde motions of the nut *d*; and that the loss thus arising affected the measure by the semi-lenses, which did not move contemporaneously; but in the instrument under our examination there is no fault of this kind.

The dynameter which Ramsden considered as on an improved construction, as it regards the imperfection just noticed, is now made by his pupil Thomas Jones, who, we have said, has also improved the pearl dynameter already described. *Figs. 10. and 11.* represent the interior parts of Thomas Jones's dynameter, which we have also before us; there is no frame *a* here, but the tube *b* contains the lenses of the eye-piece, of which that next the eye is divided, as in Dollond's instrument; and the tube *c* is the same, except that it carries a lens *k*, with which the divisions on the scale *f* are read, when the dynameter has its position reversed, after the measurement is finished. The nut *d*, and divided head *e*, are also the same as we have described; but the semi-lenses are not fixed in sliding-pieces of metal, such as we have described; neither is the screw similar to what we have above noticed. Within the tube *b* is an interior tube of much smaller diameter, and nearly of equal length, which is divided longitudinally into two similar halves, which turn on separate pivots in a gimbal, or moveable ring, within the remote end of the tube *b*, and each semi-lens is fixed in the nearer end of its own semi-tube. These semi-tubes are marked *m* and *n* respectively in *fig. 10*, and one of the pivots in the ring is at *o*; the other being at the opposite end of the diameter of the ring: the extreme ends of the pivots turn in the tube *b*. The section of the semi-tubes, holding the semi-lenses, is seen in *fig. 11*, together with the micrometer head and nut. The axis of the screw is of bell-metal, and solid: the end nearest to the micrometer head has threads of double fineness to the end within the tube, and

the action is so ingeniously contrived, that the semi-lenses are moved in contrary directions by the same screw, notwithstanding the threads all incline one way. The cylindrical nut *g* is tapped for the finer thread; and as this nut is screwed fast to the tube *b*, as seen in *fig. 11*, more plainly, the forward motion of this axis has its velocity guided by this fine part of the screw; and the end that enters the tube, presses against a stud *h*, made fast to the semi-tube of the semi-lens *1*; and a longitudinal counteracting spring concealed in tube *b*, and made fast to it at the lower end, allows the semi-tube to recede, but presses it close to the end of the screw; then another stud *l*, made fast to the semi-tube of the semi-lens *2*, is tapped for receiving the coarser thread on the axis of the same screw, which thus gives a double retrograde velocity to this semi-tube, compared with what it receives from the push of the finer screw; and as there are two threads in the fine screw for one in the coarse one, and as both are cut on the same axis, the apparent motion of the semi-lens *2*, is actually the difference of two contrary, but contemporaneous motions; and these motions are so slow, that five revolutions are equal to  $\frac{1}{7}$ th of an inch, and consequently the reading is in decimal numbers already. Otherwise, this dynameter is applied exactly as we have above explained.

Besides these dynameters, we have examined a double-image one by Dollond, in which the micrometer head was divided into forty parts, and in which the ivory disc was only  $\frac{1}{7}$ th of an inch, so that 2.50 revolutions measured the disc, and a double measure might be obtained by making the contact of the two discs first to the left and then to the right, in order to make the error of zero vanish, in which case half the sum of the two measures was the true measure corrected for the opposite errors of zero, and the graduated circle or head of the micrometer turned stiff on the axis of the screw for adjustment to zero. This instrument professed to have  $5 \times 40 = 200$  divisions in  $\frac{1}{7}$ th of an inch, and consequently only 2000 in an inch; but on examining the value of a revolution with a fine scale, we found that 198 divisions measured  $\frac{1}{7}$ th of an inch: we will therefore exemplify the use of this instrument, by shewing how the correction for the imperfection of the scale may be applied in actual practice. In the first place, the screw is turned in a retrograde direction until contact of the two discs takes place to the left of the original single disc; in this situation the 40 on the divided head must be put to zero, or the lozenge marked as a pointer to the micrometer head, and the stroke indicated on the small scale *f*, by another lozenge or index, must be noted; then turn the screw, first till the two discs unite in one, where a single measure might be taken, and then till they are again in contact to the right; in which situation, the whole diameter of one disc will have crossed the whole diameter of the other, and therefore the screw and its parts will give a double measure of the real diameter. In an actual trial of a telescope, this double measure was found to be two revolutions of the screw, and 37 parts of the head, or  $\frac{37}{40}$  of another revolution; and on an average of several trials,  $\frac{1}{7}$ th of an inch was found not exactly equal to 200, but to 198 of the divisions of the head, as we have stated above; then  $\frac{198}{200}$  of  $\frac{1}{7}$ th of an inch was the double measure of the disc; or  $\frac{198}{200} \times \frac{1}{7} = .0295$  of an inch was the single measure; and the diameter of the object-

glass being 3.24 inches, we have the power =  $\frac{3.24}{.0295} =$

110.1 with great correctness, the telescope having been perviously adjusted for viewing the solar spots. This was the determination of the power of our telescope of 63.5 inches focal distance, when No. 4. of the celestial eye-pieces was on; and in the same way all the other powers, celestial or terrestrial,

trial, may as readily be obtained. T. Jones's construction is however more convenient for use, and is more accurate, though it measures only one disc, unless the power be great, and consequently the disc small. The divided head is fixed fast to the axis of the screw, and is divided into 100 parts, 500 of which measure exactly  $\frac{1}{100}$ th of an inch, so that the inch is sub-divided into 10,000 of these parts, and the decimal numbers are read off at once without calculation: thus, when the disc is adjusted to appear single and well defined, the index, which is the edge of the scale *f*, stands at 100, or zero of the micrometer head, and the edge of the circular rim of the head is coincident with the first stroke of the scale; but when one revolution of the screw has taken place, the said edge is found coincident with the second stroke of the scale, and so on, as the divided head revolves; when the two discs were brought into contact, the quantity indicated, as seen through a lens *l*, was 2.95, viz. two revolutions, and  $\frac{95}{100}$  on the head of the screw; but in this instrument, five revolutions, we have said, are equal to  $\frac{1}{20}$ th of an inch, and therefore one revolution =  $\frac{1}{100}$ th, consequently  $\frac{2.95}{100}$ , or .0295 of an inch, is the measure, as before; so that all that is requisite to do, in registering the measures taken with this instrument, is to prefix a cipher to the figures read off by inspection, and then the decimal quantity, or divisor, is had, without further calculation, for a telescope of any aperture, either dioptric or cata-dioptric, and of any construction.

In both Dollond's and T. Jones's dynameters the disc is seen without distortion and without prismatic colours, and the instrument forms a single microscope of the most useful kind; for, by the latter in particular, small objects may have their dimensions taken to the accuracy of  $\frac{1}{100000}$ th part of an inch, and at the same time the figures may be had by inspection, from the scale and its parts, to form places in decimals when a cipher is prefixed, as we have above explained. The powers of our four telescopes, with the eye-piece of Troughton's micrometer, were found by T. Jones's double-image dynameter agreeably to the subjoined statement; viz.

In.			
30.15 focus	-	$\left\{ \begin{array}{l} 1.50 \\ .049 \end{array} \right.$	= 30.6 = power.
45.75 ditto	-	$\left\{ \begin{array}{l} 3.50 \\ .076 \end{array} \right.$	= 46.0 = ditto.
63.5 ditto	-	$\left\{ \begin{array}{l} 3.25 \\ .0504 \end{array} \right.$	= 64.5 = ditto.
118.8 ditto	-	$\left\{ \begin{array}{l} 3.000 \\ .0252 \end{array} \right.$	= 119.0 = ditto.

In all the three determinations of powers, the adjustment for vision was to a distant *terrestrial* object, and consequently these are somewhat too great. From the experience we have had of these different modes of ascertaining the powers of a telescope, we have no hesitation in giving the preference to the double-image dynameter, in which the two images may be brought into very nice contact: whereas in the pearl dynameter, which is also very good, something is always left to estimation in taking the fractional part of a division; and when *false vision* is used, the adjustment of the eyes to different distances, one within the telescope and the other without, at the same time, leaves considerable uncertainty in the size of the projected field of view, which will vary according to the state and position of the eye in every trial. We mention this last circumstance as worthy of consideration, because several micrometrical determinations of the distance between double stars have been made, particularly by sir W.

Herschel, where the *power* of the telescope determined by *false vision* is made in effect the *scale* of the *measure*; consequently if the *power* is not accurately assigned, the *measure* of the angular distance depending on it will be proportionably erroneous. Astronomers, we repeat, are yet in want of an unobjectionable mode of measuring the angular distances of *very small* double stars, which cannot be seen when extraneous light is admitted into the telescope, and which therefore have hitherto been projected on two luminous points, placed at measured distances from each other, for the purpose of ascertaining the apparent celestial interval in its magnified state, from a comparison with a known terrestrial interval in its unmagnified state, which method is liable to considerable uncertainty, and can only be admissible upon the principle of its admitting of an average taken from a succession of measures under different circumstances.

We have already explained, in our preceding section, how the powers of any telescope that has a terrestrial eye-tube, may be varied by the application of the celestial eye-pieces to the eye-end of this, by the help of adapters, and therefore we shall only say further on this part of our subject, that however the power is varied by changes of position of the eye-pieces, or by additional field-glasses, any of the dynameters will give the total power, under any of the dispositions, by the simple measurement of the disc, which we have explained: but should there be any doubt about the *exclusion* of the rays incident on the extreme circular edge of the object-glass by the diaphragm, or by Troughton's new illuminator, a measured circle, or long slip of paper, stuck to the face of the object-glass, must necessarily be substituted for the glass itself, which we were obliged to do with three out of the four of our telescopes, and then its image at the eye must be substituted for the *disc*, that we have hitherto described as the true image of the glass itself, which it will be only when *all* the rays are transmitted and refracted to a focus at the place of the said disc or image.

In all refracting telescopes, that are not achromatic, of which indeed very few are now made, the *indistinctness* of an object is directly as the area of the aperture, and inversely as the square of the focal distance of the eye-glass, when this is single, because the aberrations are proportional to these data; but in a reflecting telescope, the indistinctness will be, with spherical curves, as the sixth power of the diameter of the large speculum directly, and as the fourth power of its focal distance inversely, and also as the square of the focal distance of the eye-glass inversely.

The *light* in any telescope, refracting or reflecting, if we disregard what is lost by reflection, is directly as the squares of the linear apertures, and inversely as the square of their linear amplifications.

In refracting telescopes of various lengths, not achromatic, a given object will appear equally bright and distinct, when their linear apertures, and the focal distances of their single eye-glasses, are severally in a subduplicate ratio of their lengths, or focal distances of their object-glasses: and then also their linear amplifications will be in a subduplicate ratio of their focal lengths. But in reflecting telescopes, and in the best achromatic refractors, of various lengths, a given object will appear equally bright and equally distinct, when their linear apertures, and also their linear amplifications, are as the square-square roots of the cubes of their lengths; and consequently when the focal distances of their eye-glasses are also as the square-square roots of their lengths. See Smith's Optics, p. 140, et seq.

6. *Measures taken by Micrometrical Telescopes.*—Though the primary use of a telescope is to render a distant object visible,

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visible, by amplifying the visual angle, yet its application to the measurement of small angles was an object that engaged the astronomer's attention at no great distance of time from its invention. When the apparent diameters of the planetary bodies had once been increased, so as to subtend an appreciable angle at the eye of the observer, it soon became a matter of interest to measure those angles in their enlarged state. We have already given the description of the different MICROMETERS that have been successfully applied to a telescope for the purpose of measuring minute angles, and terrestrial distances corresponding thereto; but we have reserved our account of the means proper to be used in these operations, as constituting a portion of our present article. We propose to illustrate the use of a few of the most accurate and useful micrometers by such examples, as will suffice to render the application of any other micrometer intelligible.

When an object to be viewed is remote, the rays of light which proceed from it may be considered as coming from it in parallel lines, and in this case the focus of the object-glass, or speculum, is the shortest possible; consequently, the power of the instrument depending on this focal distance, is the smallest possible with the same eye-piece; but the rays which proceed from a near object, come to the object-glass or speculum *diverging*, and consequently do not come to a focus so soon as in the former case; so that the *power* is greater than when a distant object is viewed. This variation of power depending on the distance of the object viewed, is accompanied by a new adjustment of the eye-piece for distinct vision in every telescope of considerable magnitude; and the longer the focus of the object-glass is, the greater is the variation of power with the same variation of distance. Hence the angle that is measured by any of the micrometers attached to a telescope, is the true angle only when the object subtending that angle is remote; and a correction, depending both on the distance and focal length of the telescope, becomes necessary for converting the *apparent* measured angle into the *true* one. To a want of attention to this circumstance in the practical application of micrometrical telescopes to the measurement of terrestrial distances, is principally to be attributed the failure of their success; and celestial objects have consequently engrossed their utility almost exclusively. We conceive, therefore, that we shall render our readers an acceptable service by shewing, not only how small celestial angles may be measured by a telescope fitted up with an accurate micrometer, but also how terrestrial angles, subtended by objects at various distances, may be ascertained, and their corresponding distances be obtained with great accuracy; and that by simple vision at one station, when the distance is not very considerable. The composer of the present article has made experiments with different micrometers adapted to telescopes of various lengths, and can therefore illustrate the theory by actual examples in sufficient variety.

*Celestial Measures.*—When a micrometer of any description, mechanical or optical, is proposed to be used with a telescope, it is necessary that the value of one of its divisions be ascertained with that identical telescope when viewing a remote object, such as a heavenly body; or otherwise, that a correction for distance be applied previously to the determination of such value. We will first suppose the object at a sufficient distance to require no correction for want of parallelism of the rays of light, and will shew how to appreciate the micrometrical scale for such remote distance without correction. The diameter of the sun has been so well ascertained by actual measurement of the best instruments, from month to month, and from year to year, that it

may be taken from the Nautical Almanac, or *Connoissance des Temps*, on any given day, as a standard, from which the value of a corresponding number of divisions on the scale of the micrometer may be assigned with great accuracy, after allowance is made for apparent variation in the sun's diameter by altitude; and when the number of minutes and seconds corresponding to a certain number of divisions on the scale is ascertained, the value of one division is readily obtained by dividing the whole number of minutes and seconds by the whole number of divisions that measure the said quantity: and then whatever may have been the error of the observation, as affecting the whole scale, the quantity of it belonging to one division will be only  $\frac{1}{30}$ ,  $\frac{1}{40}$ , or  $\frac{1}{50}$  of the whole, accordingly as there were 30, 40, or 50 divisions in the scale that corresponded to the correct diameter of the sun. For instance, on the 7th of August 1815, the sun's diameter was measured at noon by a Troughton's micrometer, attached to a five-foot refracting achromatic telescope made by Tulley, and was found to be equal to 60.65 turns of the screw, when taken in a vertical direction, while the sun passed horizontally between the two parallel spider's lines in the focus of the eye-piece. In this situation the altitude of the sun was so great, that the difference between the refractions of the upper and lower limbs was insensible, and therefore may be neglected in the calculation of the value of the scale of notches that indicate the revolutions of the screw. On this day, the semi-diameter of the sun, as given in the Nautical Almanac, was  $15' 48''.3$ , and the notches corresponding to the sun's diameter were 60.65,

or 60 entire notches, and  $\frac{65}{100}$  taken from the divided head

of the screw; then  $\frac{15' 48''.3 \times 2}{60.65} = 31''.27$  is the value of

one notch, or revolution of the screw, according to this observation. Again, on the 15th of October, of the same year, the sun's diameter, at nine o'clock A. M., was found equal to 61.50 revolutions of the same screw, used with the same telescope, when the sun's semi-diameter is given  $16' 4''.8$ , or the diameter  $32' 9''.6$ ; but at the low altitude at which this measure was taken, the difference of the two refractions of the upper and lower limbs amounted, by the table of refractions, to  $2''.6$ , to be subtracted from the real to produce the apparent diameter, because the vertical diameter was contracted by this quantity, the lower limb being more elevated by refraction than the upper one; therefore, according to

this observation, the value comes out  $\frac{32' 7''}{61.5} = 31''.33$  for

each revolution; hence the average of the two measures, taken at different times, and at different altitudes, is

$\frac{31''.27 + 31''.33}{2} = 31''.3$ , which determination accords with

measures taken at other periods, and also with terrestrial measures subsequently taken, as will appear hereafter.

When this value of the micrometer's revolutions was ascertained, the solar focus of the object-glass was exactly measured, and found to be 63.5 inches. Three other achromatic telescopes were then procured, and had the same micrometer adapted to them respectively, by as many rings of brass, which had each a male and a female screw: the former to screw into the tube of its telescope, and the latter to receive the coarse thread of the micrometer; which rings we have called *adapters*. The focal lengths of the respective object-glasses were found by accurate measurement to be 30.15, 45.75, and 118.3 inches; and the corresponding

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values of the micrometer's revolution, found as above described, were 66".0, 43".5, and 16".8; viz. exactly in the inverse proportion of their focal lengths, as the theory requires. Hence, when the value of the micrometer is known with a telescope of a known focal length, its value may be had, when applied to any other telescope of a determined focal length, by reciprocal proportion; for as 30.15 in. : 63.5 in. :: 31".3 : 66".0; and conversely, when the values are known, and the focal length of one of the telescopes, the focal lengths of all the others may be determined; which is

equally the case with the powers, depending solely on the focal lengths when the same eye-piece is used with each. When the values of the micrometer screw had been determined, both by measurement of the sun, and by mutual comparison of the focal lengths of the four achromatic telescopes, the two following tables were constructed to facilitate the use of the micrometer with any or all of the said telescopes, which we subjoin as a specimen by which other tables may be constructed by the simple arrangement of the multiples of the value of unity.

TABLE I.—Values of entire Revolutions of the Micrometer's Screw, with four different Telescopes.

Revol.	30.15		45.75		63.5		118.3		Revol.	30.15		45.75		63.5		118.3	
1	1	6	0	43.5	0	31.3	0	16.8	31	34	6	22	28.5	16	10.3	8	40.8
2	2	12	1	27.0	1	2.6	0	33.6	32	35	12	23	12.0	16	41.6	8	57.6
3	3	18	2	10.5	1	33.9	0	50.4	33	36	18	23	55.5	17	12.9	9	14.4
4	4	24	2	54.0	2	5.2	1	7.2	34	37	24	24	39.0	17	44.2	9	31.2
5	5	30	3	37.5	2	36.5	1	24.0	35	38	30	25	22.5	18	15.5	9	48.0
6	6	36	4	21.0	3	7.8	1	40.8	36	39	36	26	4.0	18	14.8	10	4.8
7	7	42	5	4.5	3	39.1	1	57.6	37	40	42	26	47.5	19	18.1	10	21.6
8	8	48	5	48.0	4	10.4	2	14.4	38	41	48	27	33.0	19	49.4	10	38.4
9	9	54	6	31.5	4	41.7	2	31.2	39	42	54	28	16.5	20	20.7	11	55.2
10	11	0	7	15.0	5	13.0	2	48.0	40	44	0	29	0.0	20	52.0	11	12.0
11	12	6	7	58.5	5	44.3	3	4.8	41	45	6	29	43.5	21	23.3	11	28.8
12	13	12	8	42.0	6	15.6	3	21.6	42	46	12	30	27.0	21	54.6	11	45.6
13	14	18	9	25.5	6	46.9	3	38.4	43	47	18	31	10.5	22	25.9	12	2.4
14	15	24	10	9.0	7	18.2	3	55.2	44	48	24	31	54.0	22	57.2	12	19.2
15	16	30	10	52.5	7	49.5	4	12.0	45	49	30	32	37.5	23	28.5	12	36.0
16	17	36	11	36.0	8	20.8	4	28.8	46	50	36	33	21.0	23	59.8	12	52.8
17	18	42	12	19.5	8	52.1	4	45.6	47	51	42	34	4.5	24	31.1	13	9.6
18	19	48	13	3.0	9	23.4	5	2.4	48	52	48	34	48.0	25	2.4	13	26.4
19	20	54	13	46.5	9	54.7	5	19.2	49	53	54	35	31.5	25	33.7	13	43.2
20	22	0	14	30.0	10	26.0	5	36.0	50	55	0	36	15.0	26	5.0	14	0.0
21	23	6	15	13.5	10	57.3	5	52.8	51	56	6	36	58.5	26	36.3	14	16.8
22	24	12	15	57.0	11	28.6	6	9.6	52	57	12	37	42.0	27	7.6	14	33.6
23	25	18	16	40.5	11	59.9	6	26.4	53	58	18	38	25.5	27	38.9	14	50.4
24	26	24	17	24.0	12	31.2	6	43.2	54	59	24	39	9.0	28	10.2	15	7.2
25	27	30	18	7.5	13	2.5	7	0.0	55	60	30	39	52.5	28	41.5	15	24.0
26	28	36	18	51.0	13	33.8	7	16.8	56	61	36	40	36.0	29	12.2	15	40.8
27	29	42	19	34.5	14	5.1	7	33.6	57	62	42	41	19.5	29	44.1	15	57.6
28	30	48	20	18.0	14	36.4	7	50.4	58	63	48	42	3.0	30	15.4	16	14.4
29	31	54	21	1.5	15	7.7	8	7.2	59	64	54	42	46.5	30	46.7	16	31.2
30	33	0	21	45.0	15	39.0	8	24.0	60	66	0	43	30.0	31	18.0	16	48.0

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TABLE II.—Value of the Parts of the Micrometer's Screw, with four different Telescopes.

Parts.	30.15	45.75	63.5	118.3	Parts.	30.15	45.75	63.5	118.3	Parts.	30.15	45.75	63.5	118.3
.01	"	"	"	"	.35	"	"	"	"	.69	"	"	"	"
.02	0.7	0.4	0.3	0.2	.36	23.1	15.2	10.9	5.9	.70	45.6	30.0	21.6	11.6
.03	1.3	0.9	0.6	0.3	.37	23.8	15.6	11.3	6.0	.71	46.2	30.4	21.9	11.7
.04	2.0	1.3	0.9	0.5	.38	24.4	16.1	11.6	6.2	.72	46.9	30.9	22.2	11.9
.05	2.6	1.7	1.2	0.7	.39	25.1	16.5	11.9	6.3	.73	47.6	31.3	22.5	12.1
.06	3.3	2.2	1.6	0.8	.40	25.8	17.0	12.2	6.5	.74	48.2	31.7	22.8	12.3
.07	4.0	2.6	1.9	1.0	.41	26.4	17.4	12.5	6.7	.75	48.9	32.2	23.2	12.5
.08	4.6	3.0	2.2	1.2	.42	27.1	17.8	12.8	6.9	.76	49.5	32.6	23.5	12.6
.09	5.3	3.5	2.5	1.3	.43	27.8	18.3	13.1	7.0	.77	50.2	33.0	23.8	12.8
.10	5.9	3.9	2.8	1.5	.44	28.4	18.7	13.5	7.2	.78	50.9	33.5	24.1	12.9
.11	6.6	4.3	3.1	1.7	.45	29.1	19.1	13.8	7.4	.79	51.5	33.9	24.4	13.1
.12	7.3	4.8	3.4	1.8	.46	29.7	19.5	14.1	7.5	.80	52.2	34.4	24.7	13.3
.13	8.0	5.2	3.8	2.0	.47	30.4	20.0	14.4	7.7	.81	52.8	34.8	25.0	13.5
.14	8.6	5.6	4.1	2.2	.48	31.0	20.4	14.7	7.9	.82	53.5	35.2	25.3	13.7
.15	9.2	6.1	4.4	2.3	.49	31.7	20.9	15.0	8.0	.83	54.2	35.7	25.7	13.8
.16	9.9	6.5	4.7	2.5	.50	32.4	21.2	15.3	8.2	.84	54.8	36.1	26.0	14.0
.17	10.6	7.0	5.0	2.7	.51	33.0	21.7	15.6	8.4	.85	55.5	36.5	26.3	14.1
.18	11.2	7.4	5.3	2.8	.52	33.7	22.1	16.0	8.5	.86	56.2	37.0	26.6	14.3
.19	11.9	7.8	5.6	3.0	.53	34.4	22.6	16.3	8.7	.87	56.8	37.4	26.9	14.4
.20	12.5	8.3	5.9	3.2	.54	35.0	23.0	16.6	8.9	.88	57.5	37.8	27.2	14.6
.21	13.2	8.7	6.3	3.3	.55	35.7	23.4	16.9	9.0	.89	58.1	38.3	27.5	14.8
.22	13.9	9.1	6.6	3.5	.56	36.3	23.9	17.2	9.2	.90	58.8	38.7	27.9	14.9
.23	14.5	9.6	6.9	3.7	.57	37.0	24.3	17.5	9.4	.91	59.4	39.1	28.2	15.0
.24	15.1	10.0	7.2	3.9	.58	37.7	24.7	17.8	9.5	.92	60.1	39.6	28.5	15.2
.25	15.8	10.4	7.5	4.0	.59	38.3	25.2	18.1	9.7	.93	60.7	40.0	28.8	15.3
.26	16.5	10.9	7.8	4.2	.60	38.9	25.6	18.5	9.9	.94	61.4	40.4	29.1	15.5
.27	17.2	11.3	8.1	4.3	.61	39.6	26.1	18.8	10.0	.95	62.0	40.9	29.4	15.7
.28	17.8	11.7	8.4	4.5	.62	40.3	26.5	19.1	10.2	.96	62.7	41.3	29.7	15.9
.29	18.5	12.2	8.8	4.7	.63	41.0	26.9	19.4	10.4	.97	63.4	41.7	30.0	16.1
.30	19.2	12.6	9.1	4.9	.64	41.7	27.4	19.7	10.5	.98	64.0	42.2	30.4	16.3
.31	19.8	13.0	9.4	5.0	.65	42.3	27.8	20.0	10.7	.99	64.7	42.6	30.7	16.4
.32	20.5	13.5	9.7	5.2	.66	42.9	28.3	20.3	10.9	1.00	65.3	43.1	31.0	16.6
.33	21.2	13.9	10.0	5.3	.67	43.6	28.7	20.7	11.1		66.0	43.5	31.3	16.8
.34	21.8	14.3	10.3	5.5	.68	44.3	29.1	21.0	11.2					
.34	22.5	14.8	10.6	5.7	.68	44.9	29.6	21.3	11.4					

The use of these tables will be best understood from a few real examples.

1. The sun's diameter was taken by Troughton's micrometer, applied to the telescope of 45.75 inches focal length, on the 27th of May 1815, when his altitude was so high as to require no correction for the difference of the two refractions of the lower and upper limbs, and was found equal to 43.62 turns of the screw: then by Table I.  $43 = 31' 10''.5$ , and by Table II.  $.62 = 26''.9$ , the sum of which is  $31' 37''.4$ , the diameter given in the Nautical Almanac being  $31' 37''$ . In this observation the thickness of the spider's line was allowed for.

2. On the 7th of August 1815, the sun's diameter at noon measured 60.60 turns, when the micrometer was used with the telescope of 63.5 inches focal length; whence we have 60 in Table I. =  $31' 18''$ , and .60 in Table II. =  $18''.8$ , making together  $31' 36''.8$ , the diameter in the Nautical Almanac for that day being  $15' 48''.3 \times 2 = 31' 36''.6$ . When these measures were taken, the telescope was on an equatorial stand, and the parallel lines were so placed, that the sun's body passed along the space contained between them, without any apparent variation of

altitude, which position is necessary in every observation taken with Troughton's micrometer, when the object has an apparent motion.

3. On the 14th of August 1815, the moon's diameter was measured about 9 P.M. not far from the meridian, when her altitude was about  $18^\circ$ , with Troughton's micrometer, attached to the telescope of 45.75 inches focus, and was found equal to 41.52 turns of the screw; the horizontal semi-diameter, according to the Nautical Almanac, being at noon  $15' 4''$ , and at midnight  $15' 0''$ , consequently at the time  $15' 1''$ . To the horizontal diameter  $30' 2''$ , add the augmentation at  $18^\circ$  altitude, (from Table IV. of the requisite tables,) viz.  $5''$ , and the diameter in altitude will be  $30' 7''$ . Now from Table I. take the value of 41 turns =  $29' 43''.5$ , and from Table II. take the value of  $.52 = 22''.6$ ; the sum of which two values will be  $30' 6''.1$ , which must be increased by  $5''$ , the difference of refraction at  $18^\circ$ , and  $18^\circ 30'$  of altitude; so that the diameter, when the reductions are all made, is too great by  $4''$  nearly, which error may be in the lunar tables, or in the observation, which was made when the moon's age was only eleven days, and therefore under an unfavourable circumstance; for

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for in this situation the illuminated portion of the moon is always apparently larger than the dark portion.

4. The sun's diameter was again taken at nine o'clock A.M. on the 15th of October, with the telescope of 63.5 inches, and was found equal to 61.56 turns, when the altitude was such as to require an addition of 2".6 for the variation of the refraction in half a degree of altitude; and here we have from Table I.  $60 + 1 = 31' 18'' + 31''.3 = 31' 49''.3$ , and from Table II.  $.56 = 17''.5$ , making, together with + 2".6 the correction, the sum  $32' 9''.4$ , the diameter given in the Nautical Almanac being  $16' 4''.8 \times 2 = 32' 9''.6$ .

In all these examples, as well as in the data from which the preceding tables were computed, Troughton's micrometer was used as a celestial eye-piece, where the object was consequently inverted, which is the manner in which this micrometer was intended to be used; but according to the construction of the modern terrestrial eye-tube, this micrometer may be substituted, by help of an adapter, for the two glasses at the eye-end of this tube, in which situation the magnifying power is very considerably increased, and consequently the scale rendered capable of measuring smaller portions of a second, than in the usual way, particularly when there is light enough in the field of view, *i. e.* when the object-glass has a large diameter. When the micrometer in question is applied to the eye-end of the terrestrial tube of the telescope of 45.75 inches, one turn is equal to only 16".03, which shews the power to be somewhat greater than when the 118.8 inches telescope was used as a celestial telescope with the same micrometer; and with the telescope of 63.5 inches, which has three pair of separate field-glasses, the terrestrial powers with the said micrometer gives the respective values of one turn of the screw 9".97, 7".98, and 5".15; so that this telescope has four various values of the micrometrical scale, which may be used in succession for measuring the same angle, according to circumstances, and each variety may have a separate table computed for its particular use. This application of Troughton's micrometer to the terrestrial tube, and the additional pairs of field-glasses, were contrived by the author of this article, and led to another addition, which in itself admits of still greater varieties. On observing that the modern terrestrial eye-tube is in fact a *compound microscope*, it occurred to him, that there are three modes of increasing the power of this instrument; first, by shortening the compound focus of the eye-glasses; secondly, by shortening the compound focus of the pair of field-glasses; and thirdly, by lengthening the distance between the compound eye-glass and compound field-glass (or object-glass of the microscope). The two former modes had now been tried, and afforded the varieties in the measures which we have specified: the last one was therefore resorted to thus; a tube was made to slide within the terrestrial tube, after its own eye-piece was withdrawn, and the micrometer was made to screw into this moveable tube, so as to vary the distance of the micrometer glasses from the field-glasses of the telescope at pleasure. The result proved as was expected; every new position for distance gave a new value to the scale of the micrometer, and the two extremes of these values, with the 63.5 inch telescope, were 10" and 5" respectively *per* revolution of the screw; at least the points were found by experiment on the sliding tube, where these values, and also the intermediate ones 9", 8", 7", and 6" *per* revolution, were marked with a graver. The distances of these points depended on the field-glasses used with the sliding tube; and three sets of points were inserted, to correspond to the three pairs of field-glasses, any one of which admitted the scale to be subdivided into tenths of a

second. This mode of applying a sliding micrometer in the terrestrial tube is as useful as novel; for when the position is made for an exact number of seconds *per* turn of the screw, the tables are dispensed with; the only operation being to multiply the number of turns by the number of seconds belonging to the position of the sliding tube, and then to reduce them to minutes by 60 as a divisor. A few examples will render these new methods of using the micrometer perfectly intelligible, and will at the same time shew that they contribute greatly to accuracy, by a species of repetition of the measure, of which they are capable. We will first exemplify the method without the sliding tube.

1. The measures of Jupiter's diameter, taken by the 63.5 inch telescope on the 19th of April 1816, were as follow:

By Troughton's micrometer used	}	
as a celestial eye-piece	-	$1.43 \times 31.3 = 44.8$
By N <sup>o</sup> 1. of the field-glasses with	-	$4.23 \times 9.97 = 42.2$
the terrestrial tube	-	$5.53 \times 7.98 = 44.13$
By N <sup>o</sup> 2. of ditto	-	$8.32 \times 5.15 = 42.85$
By N <sup>o</sup> 3. of ditto	-	<u>4) 173.98</u>
Average of the four measures	-	<u>43.495</u>

The values of the three field-glasses had been taken by terrestrial measurement at 700 feet, on the 31st of March 1816, and may require farther correction.

2. On the 30th of April 1816, Jupiter being very nearly in opposition, his diameter was measured with the 45.75 inch telescope, which has only two varieties, a celestial and a terrestrial application of the micrometer, and the result was thus: *viz.*

By the celestial measure, taken to the	}	
right of zero	-	1.04 turns.
By the same, taken to the left of zero	-	1.05 ditto.
	}	<u>2) 2.09</u>
By the terrestrial measure $2.72 \times 16''.03$	-	$1.045 = 43.52$
	-	<u>43.50</u>
	}	<u>2) 87.02</u>

The average of the celestial and terrestrial measures = 43.51

3. On the 25th of October 1815, the following measures were taken of the diameter of Mars with Troughton's micrometer attached to the sliding tube of the telescope 63.5 inches; *viz.*

First position at the dot of 7" }	}	Turns.
with third field-glass	-	$3.43 \times 7 = 24.01$
Second position with ditto	-	$2.96 \times 8 = 23.68$
Third position with ditto	-	$2.68 \times 9 = 24.12$
Fourth position with ditto	-	$2.40 \times 10 = 24.00$
With N <sup>o</sup> 1. field-glass and its	}	$6.0 \times 4 = 24.00$
dot 4" - - -	-	$3.0 \times 8 = 24.00$
With N <sup>o</sup> 2. field-glass and its	}	$0.77 \times 31.3 = 24.10$
dot 8" - - -	-	<u>7) 167.91</u>
With the micrometer used as a	}	<u>23.987</u>
celestial eye-piece	-	<u>These</u>

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These observations of Mars were made near the meridian, when he was a little past opposition, and consequently when his diameter was near a maximum, which circumstance we mention, because astronomers have given very discordant accounts of the apparent diameter of this planet; and perhaps no determination has been more accurate than we have here given.

4. The sun's diameter was measured at noon on the 24th of September 1816, by Troughton's micrometer adapted to the 30.15 inch telescope, in the following manner; viz.

By the celestial power	-	29.21	$\times$	$65''.7$	$=$	$31' 59''.1$
By the terrestrial, with the eye-	}	63.92	$\times$	30	$=$	$31' 57''.6$
tube slid to dot 30''		68.50	$\times$	28	$=$	$31' 58''.0$
By the terrestrial, at dot 28''		76.74	$\times$	25	$=$	$31' 58''.5$
By the terrestrial, at dot 25''						4)127 53.2

Average measure	-	-	-	-	$=$	$31' 58''.3$
By the Nautical Almanac	-	$15' 59''.1$	$\times$	2	$=$	$31' 58''.2$

On the sliding tube of this telescope, the dots on the scale run from  $31''$  to  $19''$ , at which dots the powers are to each other inversely as these numbers; but the whole diameter of the sun cannot be taken on the scale of the micrometer when a greater power is used, than when the position is at dot  $25''$ , or middle dot of the sliding tube, where the power is about 82.

In these four examples, the diameters measured were the vertical diameters, for taking which Troughton's micrometer is peculiarly adapted; but the horizontal diameter of a body in motion cannot be taken with the same accuracy with this instrument, on account of the difficulty of keeping the extreme edges of the object in contact with the spider's lines, while the final adjustment of the measure is making. For this purpose, Dollond's divided object-glass micrometer is more convenient, and may have its scale appreciated, and the values thereof tabulated in the way we have already explained. For instance, we obtained a divided object-glass, with the requisite adjustments both for circular motion and for the separation of the centre of the semi-lenses, of three inches and a half diameter, and fitted it over the object-end of the 45.75 inch achromatic of Tulley, while the original object-glass, of the same dimensions, remained in its place. The focus of this divided object-glass was so long, that it shortened the original focus only to 40.3 inches. The scale of the object-glass is divided into inches and twentieth parts of an inch, one of which parts or subdivisions is again reduced by a vernier into twenty-five subordinate parts, so that  $\frac{1}{25}$  of  $\frac{1}{20}$ , or  $\frac{1}{500}$ th of an inch, is the smallest quantity appreciable by the vernier. On the 9th of August 1816, when the sun's diameter was  $31' 37''$ , or  $1897''$ , the opposite limbs of the two apparent images of the sun coincided when the scale indicated three inches, one-twentieth part, and eleven towards 25 on the vernier, after an allowance was made for the index error by a crossed observation of a very small angle. Now these numbers reduced into the lowest denomination, give 1536 parts of the vernier, and

$\frac{1897''}{1536} = 1''.235$  is the value of one of those parts; but by

a terrestrial measurement, to be explained hereafter, the value taken at 700 feet distance, with a correction for want of parallelism of the rays at this distance, the value came

out  $\frac{888''}{713} = 1''.245$ ; the average of which two determina-

tions, unconnected with each other, is  $1''.24$  for each unit read on the vernier, and this determination was afterwards confirmed by an observation of the sun taken on the 25th

September 1816, viz.  $\frac{1919''}{1549} = 1''.24$  very nearly. After

having given a value to Dollond's micrometer thus fitted up, on the 21st of August 1816, the diameter of Saturn's ring was measured when its longer diameter was very nearly horizontal, both to the right and left of zero, and was found equal to one subdivision and 7.7 on the vernier, or  $25 + 7.7 = 32.7$  parts of the vernier; then  $32.7 \times 1''.24 = 40''.548$  is the measure of the greatest length of Saturn's ring taken near the meridian, when the passage was at nearly 28 minutes past eleven P.M.; and, consequently, when the planet was at no greater distance than eight days from opposition. On the 4th of August 1815, the greatest diameter of Saturn's ring however, measured with Troughton's micrometer attached to the 63.5 inch telescope, had been found by careful measurement  $= 1.50 \times 31''.3 = 46''.95$ , the planet being then only three days from opposition. By the same apparatus the ring had been made  $48''.2$  on the 10th of September 1815, and on the 25th of the same month only  $45''$ . These discrepancies shew that no dependence can be placed in horizontal measures made with Troughton's micrometer when the object is in apparent motion, but for all other measures of small angles, it is no doubt the best that has been yet invented.

Dr. Brewster's micrometer has the same advantage as Dollond's, when the divided lens is used as the sliding lens within the tube; but the power of the patent telescopes hitherto constructed is so small, that an angle can seldom be measured with it nearer than to  $10''$ , and frequently not so near. The principle, however, is applicable to telescopes of larger dimensions.

When Dollond's and Troughton's micrometers are both applied to the telescope of 45.75 inches, the value of the scale of Troughton's becomes altered from  $43''.5$  to  $49''.4$ , namely, in the inverse ratio of the diminished focus; and they may both be used with great convenience at the same time, in which case, one may measure the angular length and the other the angular breadth of the same body; or, if the body be celestial, one may give the horizontal and the other the vertical dimensions at the same instant. This mode of applying two micrometers, one optical and the other mechanical, at the same time, affords a mutual check on the measures of each, when the body is round, like one of the heavenly bodies, and gives a very satisfactory result, when it can be adopted. When Troughton's micrometer is used as a celestial eye-piece, along with Dollond's micrometer attached to the telescope 45.75, shortened to 40.3, the double images are formed beyond both eye-glasses, reckoning from the eye, and gives there  $1''.24$  as the value of one stroke on the vernier; whereas when a common celestial eye-piece is used with Dollond's, the second glass of the compound piece shortens the focus of the object-glass a little, and the images are seen between the two glasses of the eye-piece; consequently the value of Dollond's micrometer varies a trifle with every different eye-piece, which is not the case with Troughton's, where the image is always in the unaltered focus of the object-glass. On the 26th of September 1816, a careful series of observations was made of the sun's diameter with both Troughton's and Dollond's micrometers used at the same time, when the former gave  $38.85 \times 49''.4 = 31' 59''.2$ , and the other  $15.47$  (3 in. 1 div. 22 on vern.)  $\times 1''.21 = 31' 58''.28$ , the diameter of the sun by the Nautical Almanac being

being

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being  $31' 59''.2$  horizontally, and  $31' 57''.9$  vertically, at the altitude of  $38^\circ$ .

*Terrestrial Measures.*—In the examples which we have given of celestial angular measures taken, by a micrometrical telescope, no correction of the measured angle was necessary, because the rays of light coming from these objects may be considered as parallel on entering the object-glass, and as always converging to the same focal point, where the image is formed; hence the magnifying power of the celestial telescope does not vary. But when terrestrial objects are viewed at different distances, there is a deviation from parallelism in the course of the rays, which increases in the inverse ratio of the distance, and which lengthens the focus of the object-glass, and consequently increases the power of the instrument, even with the same glasses. This alteration in the effective length of a telescope is practically discovered by the adjustment of the eye-piece for distinct vision, which is necessarily different at different distances from the object viewed. But we have shewn, that the scales of Troughton's and of Dollond's micrometers will vary with the variable powers of even the same telescope, and therefore will require a correction for each variety of power, or, in other words, for each variety of terrestrial distance. The determination of these varying corrections, therefore, is essential to the accuracy of the measures taken by a micrometer in all cases, where the incident rays of light come diverging from objects placed at moderate distances. If we put  $f$  for the solar or principal focus of the object-glass of any telescope, and  $d$  for the distance of an object from the said object-glass when used, the addition to the length of the solar focus, which we will call  $e$ , according to the

laws of *dioptrics*, may be found by this theorem,  $\frac{f^2}{d-f} = e$ ;

that is, the square of the solar focus, divided by the distance in the same measure, when diminished by one focal distance, will be the elongation, or excess of the lengthened focus over the solar focus; then as the powers are to each other respectively as the focal lengths, with the same eye-piece, we shall have  $f : f + e :: \text{true angle} : \text{measured or apparent angle}$ ; and conversely, as  $f + e : f :: \text{apparent}$

angle : true angle. For instance, let it be required to ascertain what is the necessary correction for an angle, measured by a telescope of 63.5 inches focus, that is subtended by one yard at a hundred yards distance from the object-glass. By a simple case in plain trigonometry, the true angle subtended by a yard, at a hundred yards distance, is  $34' 59''.4$ , or  $34'.99$ ; and 63.5 inches are 1.764, when reduced into the denomination of yards and decimal parts; then

$$\frac{1.764 \times 1.764}{100 - 1.764} = \frac{3.111696}{98.236} = 0.03167 = e, \text{ the increased}$$

length of the focus; and  $\frac{1.764 + 0.03167 \times 34'.99}{1.704} =$

$35'.618$ , or  $35' 37''.08$  will be the measured angle, therefore  $35' 37''.08 - 34' 59''.4 = 37''.68$  is the correction to be added to the true angle, in order to obtain the apparent angle, that would have been the true angle also, if the focus of the object-glass had remained unaltered at the distance of 100 yards. But it is the correction answering to the apparent or measured angle that we want, and the determination of this requires a transposition which is operose, and therefore objectionable in practice; on which account we recommend each surveyor, military tactician, and leveller, who is disposed to avail himself of the use of a micrometrical telescope, for shortening his labours, to use tables adapted to the focal length of his own telescope, which may give by inspection the correction proper in all cases for reducing the apparent angle into the true one, and *vice versa*. Tables III. and IV. which are subjoined, were computed for this purpose, from the theorem just exemplified, and are adapted for a telescope of 63.5 inches focal length, to which we have added Table V., as a general table for finding the distance, in yards and decimal parts, corresponding to any angle, from  $1'$  to  $30' 59''$  inclusively; even to the accuracy of a single second, when that angle is subtended by an exact yard. The labour of constructing these tables has been considerable, but the facility and accuracy with which they give the desired results, has amply repaid the computer, and, it is presumed, will be a recommendation to the notice of our scientific readers, to whom their application may in many cases be found useful.

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TABLE III.—For converting the true into the apparent Angle.

True Angle	0''	10''	20''	30''	40'	50''
1'	+0.03	+0.04	+0.05	+0.06	+0.08	+0.10
2	0.12	0.14	0.16	0.19	0.22	0.25
3	0.28	0.31	0.34	0.37	0.41	0.45
4	0.49	0.53	0.57	0.61	0.66	0.71
5	0.76	0.81	0.86	0.92	0.98	1.04
6	1.10	1.16	1.22	1.29	1.36	1.43
7	1.50	1.57	1.64	1.71	1.79	1.87
8	1.96	2.04	2.12	2.20	2.28	2.37
9	2.46	2.54	2.63	2.72	2.82	2.92
10	3.03	3.14	3.25	3.36	3.46	3.57
11	3.68	3.79	3.90	4.02	4.14	4.26
12	4.39	4.51	4.64	4.76	4.89	5.02
13	5.15	5.29	5.43	5.57	5.71	5.85
14	5.99	6.13	6.28	6.43	6.58	6.73
15	6.88	7.03	7.18	7.33	7.48	7.64
16	7.80	7.96	8.13	8.36	8.47	8.64
17	8.82	8.99	9.17	9.35	9.53	9.71
18	9.89	10.07	10.25	10.44	10.63	10.82
19	11.01	11.20	11.39	11.59	11.79	11.99
20	12.19	12.40	12.61	12.82	13.04	13.26
21	13.48	13.69	13.90	14.11	14.32	14.53
22	14.74	14.96	15.18	15.40	15.63	15.86
23	16.09	16.33	16.57	16.81	17.05	17.29
24	17.53	17.77	18.01	18.25	18.49	18.74
25	18.99	19.25	19.51	19.77	20.03	20.29
26	20.56	20.82	21.08	21.34	21.60	21.87
27	22.14	22.41	22.68	22.96	23.24	23.52
28	23.81	24.09	24.37	24.66	24.95	25.24
29	25.53	25.82	26.11	26.41	26.71	27.01
30	27.31	27.61	27.91	28.21	28.52	28.83
31	29.14	29.45	29.77	30.09	30.41	30.73
32	31.05	31.37	31.69	32.01	32.33	32.66
33	32.99	33.32	33.65	33.99	34.33	34.67
34	35.01	35.35	35.69	36.03	36.38	36.73
35	37.08	37.43	37.79	38.15	38.51	38.87
36	39.23	39.59	39.95	40.31	40.67	41.03
37	41.40	41.77	42.14	42.51	42.88	43.25
38	43.62	44.00	44.38	44.76	45.15	45.54
39	45.93	46.32	46.71	47.10	47.49	47.89
40	48.29	48.70	49.11	49.52	49.93	50.34
41	50.75	51.16	51.57	51.98	52.39	52.81
42	53.23	53.65	54.08	54.51	54.94	55.37
43	55.80	56.23	56.66	57.09	57.52	57.95
44	58.38	58.82	59.26	59.71	60.16	60.61
45	61.06	61.51	61.96	62.41	62.86	63.31
46	63.77	64.22	64.67	65.12	65.58	66.04
47	66.50	66.96	67.42	67.88	68.34	68.81
48	69.28	69.75	70.22	70.70	71.18	71.66
49	72.14	72.63	73.12	73.61	74.11	74.61
50	75.11	75.61	76.11	76.61	77.12	77.63
51	78.14	78.66	79.18	79.70	80.22	80.74
52	81.26	81.78	82.36	82.83	83.36	83.99
53	84.42	84.95	85.48	86.01	86.54	87.08
54	87.62	88.15	88.69	89.23	89.77	90.31
55	90.85	91.39	91.93	92.48	93.03	93.58
56	94.13	94.68	95.23	95.78	96.33	96.88
57	97.43	97.98	98.53	99.09	99.65	100.21
58	100.77	101.33	101.89	102.46	103.03	103.60
59	104.17	104.75	105.33	105.91	106.50	107.09
60	107.68	108.27	108.86	109.45	110.04	110.64

TABLE IV.—For converting the apparent into the true Angle.

Apparent Angle.	0''	10''	20''	30''	40''	50''
1'	-0.03	-0.04	-0.05	-0.06	-0.08	-0.1
2	0.1	0.1	0.1	0.2	0.2	0.2
3	0.3	0.3	0.3	0.4	0.4	0.5
4	0.5	0.5	0.6	0.6	0.7	0.7
5	0.8	0.8	0.9	0.9	1.0	1.0
6	1.1	1.1	1.2	1.3	1.3	1.4
7	1.5	1.6	1.7	1.7	1.8	1.9
8	2.0	2.0	2.1	2.2	2.3	2.4
9	2.5	2.6	2.7	2.8	2.9	3.0
10	3.1	3.2	3.3	3.4	3.5	3.6
11	3.7	3.8	3.9	4.0	4.1	4.3
12	4.4	4.5	4.6	4.7	4.8	4.9
13	5.0	5.2	5.4	5.5	5.7	5.8
14	5.9	6.0	6.2	6.3	6.5	6.6
15	6.8	7.0	7.1	7.3	7.4	7.5
16	7.7	7.8	8.0	8.1	8.3	8.5
17	8.7	8.8	9.0	9.2	9.4	9.5
18	9.7	9.8	10.0	10.2	10.4	10.6
19	10.8	11.0	11.2	11.4	11.6	11.8
20	12.0	12.2	12.4	12.6	12.8	13.1
21	13.3	13.5	13.6	13.8	14.0	14.2
22	14.4	14.6	14.7	14.9	15.1	15.3
23	15.6	15.8	16.0	16.2	16.5	16.7
24	17.0	17.2	17.5	17.7	18.0	18.2
25	18.5	18.7	19.0	19.2	19.5	19.7
26	20.0	20.2	20.5	20.8	21.0	21.2
27	21.5	21.7	22.0	22.3	22.5	22.8
28	23.0	23.3	23.6	23.9	24.2	24.5
29	24.8	25.1	25.4	25.7	26.0	26.3
30	26.6	26.9	27.1	27.4	27.7	28.0
31	28.3	28.6	28.8	29.1	29.4	29.7
32	30.0	30.3	30.6	31.0	31.3	31.6
33	32.0	32.3	32.7	33.0	33.3	33.6
34	33.9	34.2	34.5	34.9	35.2	35.5
35	35.8	36.1	36.4	36.7	37.1	37.5
36	37.8	38.1	38.5	38.9	39.3	39.6
37	40.0	40.3	40.8	41.0	41.3	41.7
38	42.0	42.3	42.7	43.1	43.5	43.9
39	44.2	44.5	44.9	45.2	45.6	46.0
40	46.4	46.8	47.2	47.6	48.0	48.4
41	48.8	49.2	49.6	50.0	50.4	50.7
42	51.0	51.4	51.8	52.2	52.6	53.0
43	53.4	53.8	54.2	54.7	55.1	55.6
44	56.0	56.4	56.8	57.3	57.7	58.1
45	58.5	58.9	59.3	59.8	60.2	60.7
46	61.1	61.6	62.1	62.5	62.8	63.2
47	63.6	64.1	64.5	64.9	65.3	65.8
48	66.2	66.7	67.1	67.5	68.0	68.4
49	68.9	69.3	69.8	70.2	70.7	71.1
50	71.6	72.0	72.4	72.9	73.3	73.8
51	74.3	74.8	75.3	75.8	76.2	76.7
52	77.2	77.7	78.2	78.7	79.2	79.7
53	80.2	80.7	81.2	81.7	82.2	82.7
54	83.2	83.7	84.2	84.7	85.2	85.7
55	86.2	86.7	87.2	87.7	88.2	88.7
56	89.2	89.7	90.3	90.8	91.3	91.8
57	92.3	92.8	93.3	93.8	94.3	94.9
58	95.4	95.9	96.4	97.0	97.5	98.1
59	98.6	99.1	99.6	100.2	100.7	101.3
60	101.8	102.4	102.9	103.5	104.0	104.5

# TELESCOPE.

TABLE V.—For finding the Distance in Yards from the True Angle subtended by one Yard.

True Angle.	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"
1'	3437.7	3381.34	3326.8	3274.	3222.8	3173.26	3125.15	3078.54	3033.25	2989.3
2	1718.85	1704.64	1690.67	1676.93	1663.4	1650.1	1637.	1624.11	1611.4	1598.93
3	1145.9	1139.56	1133.3	1127.11	1120.98	1114.92	1108.94	1103.	1097.15	1091.33
4	859.43	855.83	852.32	848.81	845.33	841.88	838.46	835.06	831.7	828.36
5	687.54	685.25	682.98	680.73	678.45	676.27	674.05	671.86	669.63	667.51
6	572.95	571.36	569.78	568.21	566.65	565.10	563.55	562.02	560.49	558.98
7	491.1	489.93	488.77	487.62	486.46	485.32	484.18	483.05	481.92	480.80
8	429.71	428.81	427.91	427.03	426.16	425.28	424.40	423.53	422.66	421.80
9	381.96	381.25	380.55	379.85	379.15	378.46	377.77	377.07	376.39	375.70
10	343.77	343.19	342.62	342.05	341.49	340.93	340.36	339.79	339.23	338.69
11	312.52	312.02	311.52	311.09	310.63	310.17	309.70	309.23	308.77	308.31
12	286.47	286.07	285.68	285.28	284.89	284.49	284.10	283.71	283.32	282.93
13	264.44	264.10	263.76	263.42	263.09	262.76	262.42	262.08	261.75	261.42
14	245.55	245.26	244.97	244.67	244.38	244.09	243.81	243.52	243.23	242.94
15	229.18	228.92	228.67	228.41	228.16	227.91	227.66	227.41	227.16	226.91
16	214.85	214.62	214.40	214.17	213.95	213.72	213.51	213.29	213.08	212.86
17	202.22	202.02	201.82	201.62	201.42	201.22	201.03	200.83	200.64	200.44
18	190.98	190.80	190.62	190.35	190.27	190.09	189.92	189.74	189.57	189.40
19	180.93	180.77	180.61	180.45	180.29	180.13	179.98	179.82	179.67	179.51
20	171.88	171.73	171.59	171.44	171.31	171.17	171.02	170.88	170.74	170.60
21	163.70	163.57	163.44	163.31	163.18	163.05	162.92	162.79	162.66	162.53
22	156.26	156.13	156.01	155.88	155.76	155.64	155.54	155.42	155.31	155.19
23	149.46	149.35	149.24	149.13	149.03	148.93	148.82	148.71	148.60	148.49
24	143.23	143.13	143.03	142.94	142.84	142.75	142.64	142.54	142.44	142.34
25	137.51	137.41	137.32	137.23	137.14	137.05	136.96	136.87	136.78	136.68
26	132.22	132.13	132.05	131.96	131.88	131.80	131.71	131.62	131.54	131.46
27	127.32	127.24	127.16	127.08	127.00	126.93	126.85	126.77	126.69	126.61
28	122.78	122.70	122.63	122.55	122.48	122.41	122.33	122.26	122.19	122.11
29	118.54	118.47	118.40	118.33	118.26	118.19	118.13	118.07	118.00	117.93
30	114.59	114.52	114.46	114.39	114.33	114.27	114.20	114.14	114.08	114.01

# TELESCOPE.

TABLE V.—*continued.*

True Angle.	10"	11"	12"	13"	14"	15"	16"	17"	18"	19"
1'	2946.6	2905.1	2867.75	2825.5	2787.25	2750.16	2713.97	2678.73	2644.38	2610.91
2	1586.63	1574.52	1567.57	1550.84	1539.27	1527.86	1516.62	1505.56	1494.65	1483.9
3	1085.6	1079.9	1054.27	1068.71	1063.25	1057.75	1052.35	1047.01	1041.74	1036.49
4	825.05	821.76	818.5	815.22	812.05	808.86	805.7	802.57	799.46	796.37
5	665.36	663.22	661.09	658.98	656.88	654.8	652.73	650.67	648.62	646.58
6	557.46	555.96	554.47	552.98	551.5	550.03	548.58	547.12	545.66	544.23
7	479.68	478.59	477.66	476.36	475.26	474.16	473.08	472.0	470.92	469.84
8	420.94	420.08	419.23	418.38	417.53	416.69	415.85	415.01	414.18	413.35
9	375.02	374.34	373.66	372.98	372.31	371.64	370.97	370.31	369.65	368.98
10	338.13	337.57	337.62	336.47	335.93	335.38	334.82	334.29	333.76	333.22
11	307.85	307.39	306.93	306.47	306.02	305.57	305.12	304.67	304.22	303.77
12	282.55	282.16	281.77	281.39	281.01	280.63	280.24	279.86	279.49	279.11
13	261.09	260.76	260.13	260.11	259.78	259.45	259.12	258.80	258.47	258.15
14	242.66	242.37	242.09	241.80	241.52	241.24	240.96	240.68	240.40	240.12
15	226.66	226.41	226.6	225.91	225.67	225.42	225.18	224.93	224.69	224.44
16	212.64	212.42	212.20	211.98	211.76	211.54	211.33	211.11	210.90	210.68
17	200.25	200.05	199.86	199.66	199.47	199.28	199.09	198.90	198.71	198.52
18	189.23	189.05	188.88	188.70	188.53	188.36	188.19	188.02	187.85	187.68
19	179.35	179.19	179.04	178.88	178.73	178.57	178.42	178.26	178.11	177.96
20	170.46	170.32	170.8	170.04	169.90	169.76	169.62	169.48	169.34	169.20
21	162.41	162.28	162.16	162.03	161.91	161.77	161.65	161.51	161.39	161.26
22	155.08	154.96	154.85	154.73	154.62	154.50	154.38	154.27	154.15	154.03
23	148.38	148.27	148.17	148.06	147.96	147.85	147.75	147.64	147.54	147.43
24	142.24	142.14	142.05	141.95	141.85	141.75	141.66	141.56	141.46	141.36
25	136.59	136.50	136.41	136.32	136.23	136.14	136.05	135.96	135.87	135.79
26	131.38	131.29	131.21	131.12	131.04	130.95	130.87	130.79	130.71	130.62
27	126.54	126.45	126.38	126.30	126.23	126.14	126.07	125.99	125.92	125.84
28	122.04	121.97	121.90	121.83	121.76	121.69	121.62	121.54	121.47	121.40
29	117.86	117.79	117.73	117.66	117.59	117.52	117.46	117.39	117.32	117.26
30	113.95	113.89	113.83	113.76	113.70	113.64	113.58	113.51	113.45	113.39

# TELESCOPE.

TABLE V.—*continued.*

True Angle.	20"	21"	22"	23"	24"	25"	25"	27"	28"	29'
1'	2578.27	2546.44	2515.4	2485.1	2455.5	2426.6	2398.4	2370.82	2343.87	2317.55
2	1473.3	1462.86	1452.55	1442.38	1432.37	1422.49	1412.75	1403.14	1393.62	1384.31
3	1031.31	1026.17	1021.1	1016.07	1011.05	1006.16	1001.27	996.43	991.64	986.9
4	793.32	790.24	787.26	784.26	781.28	778.34	775.42	772.51	769.64	766.78
5	644.56	642.56	640.56	638.38	636.61	634.65	632.70	630.77	628.85	626.94
6	542.8	541.37	539.95	538.56	537.18	535.75	534.36	532.99	531.62	530.25
7	468.77	467.70	466.63	465.59	464.55	463.51	462.47	461.46	460.45	459.41
8	412.53	411.70	410.88	410.06	409.25	408.42	407.61	406.81	406.03	405.22
9	368.33	367.66	367.02	366.36	365.71	365.06	364.42	363.78	363.14	362.49
10	332.68	332.14	331.61	331.08	330.55	330.02	329.49	328.96	328.44	327.92
11	303.32	302.87	302.43	301.99	301.55	301.11	300.67	300.23	299.80	299.36
12	278.73	278.35	277.98	277.60	277.23	276.86	276.49	276.12	275.75	275.38
13	257.82	257.49	257.16	256.83	256.51	256.20	255.90	255.58	255.27	254.96
14	239.84	239.56	239.29	239.01	238.73	238.45	238.18	237.90	237.63	237.35
15	224.20	223.95	223.71	223.46	223.22	222.98	222.74	222.50	222.26	222.02
16	210.47	210.25	210.04	209.82	209.61	209.40	209.19	208.97	208.76	208.55
17	198.33	198.13	197.94	197.75	197.56	197.37	197.18	197.09	196.81	196.72
18	187.51	187.34	187.17	187.00	186.83	186.66	186.49	186.32	186.15	185.98
19	177.81	177.65	177.50	177.35	177.20	177.04	176.89	176.74	176.59	176.44
20	169.06	168.92	168.78	168.64	168.51	168.37	168.24	168.10	167.97	167.82
21	161.14	161.01	160.89	160.76	160.64	160.51	160.39	160.26	160.14	160.01
22	153.92	153.80	153.69	153.57	153.46	153.34	153.23	153.12	153.01	152.89
23	147.33	147.22	147.12	147.01	146.91	146.80	146.70	146.59	146.49	146.38
24	141.27	141.17	141.08	140.98	140.88	140.78	140.69	140.59	140.50	140.40
25	135.70	135.61	135.52	135.43	135.34	135.25	135.16	135.07	134.98	134.89
26	130.54	130.46	130.38	130.29	130.21	130.13	130.05	129.97	129.89	129.80
27	125.77	125.69	125.62	125.54	125.47	125.38	125.31	125.23	125.16	125.08
28	121.33	121.25	121.18	121.11	121.04	120.97	120.90	120.83	120.76	120.69
29	117.19	117.12	117.05	116.98	116.92	116.85	116.78	116.71	116.65	116.58
30	113.33	113.26	113.20	113.14	113.08	113.01	112.95	112.89	112.83	112.77

# TELESCOPE.

TABLE V.—*continued.*

True Angle.	30"	31"	32"	33"	34"	35"	36"	37"	38"	39"
1'	2291.8	2266.61	2241.97	2217.87	2194.3	2171.2	2148.55	2126.41	2104.7	2083.47
2	1375.08	1365.97	1356.93	1348.1	1339.36	1330.72	1322.19	1313.77	1305.45	1297.23
3	982.2	977.54	972.93	968.36	963.84	959.36	954.91	950.51	946.15	941.83
4	763.93	761.11	758.31	755.54	752.78	750.04	747.33	744.62	741.95	739.29
5	625.03	623.15	621.23	619.40	617.55	615.71	613.87	612.05	610.24	608.44
6	528.88	527.53	526.18	524.84	523.50	522.18	520.87	519.55	518.24	516.95
7	458.36	457.34	456.33	455.33	454.32	453.32	452.33	451.34	450.36	449.37
8	404.43	403.64	402.85	402.06	401.29	400.51	399.73	398.95	398.19	397.41
9	361.86	361.22	360.59	359.96	359.35	358.71	358.09	357.47	356.85	356.23
10	327.40	326.88	326.36	325.84	325.33	324.82	324.32	323.81	323.29	322.78
11	298.93	298.49	298.06	297.65	297.20	296.77	296.35	295.92	295.50	295.08
12	275.01	274.65	274.29	273.92	273.56	273.18	272.83	272.47	272.11	271.75
13	254.64	254.33	254.02	253.71	253.39	253.08	252.76	252.46	252.15	251.85
14	237.08	236.81	236.54	236.27	236.00	235.73	235.46	235.19	234.92	234.65
15	221.78	221.54	221.31	221.07	220.83	220.59	220.36	220.12	219.89	219.66
16	208.34	208.13	207.92	207.71	207.50	207.29	207.09	206.88	206.67	206.46
17	196.44	196.24	196.06	195.87	195.69	195.50	195.32	195.13	194.95	194.76
18	185.82	185.64	185.48	185.31	185.15	184.98	184.82	184.65	184.49	184.32
19	176.29	176.14	175.99	175.84	175.69	175.54	175.39	175.24	175.09	174.94
20	167.69	167.54	167.41	167.27	167.14	167.00	166.87	166.73	166.60	166.47
21	159.89	159.76	159.64	159.51	159.39	159.27	159.15	159.02	158.90	158.78
22	152.78	152.67	152.56	152.45	152.33	152.22	152.11	151.99	151.88	151.77
23	146.28	146.17	146.07	145.97	145.86	145.76	145.66	145.56	145.46	145.35
24	140.31	140.21	140.12	140.02	139.93	139.83	139.74	139.64	139.55	139.45
25	134.81	134.73	134.64	134.55	134.46	134.37	134.29	134.20	134.11	134.02
26	129.72	129.64	129.56	129.48	129.40	129.31	129.23	129.15	129.07	128.99
27	125.01	124.93	124.86	124.78	124.71	124.63	124.55	124.47	124.40	124.32
28	120.62	120.55	120.48	120.41	120.34	120.27	120.20	120.13	120.06	119.99
29	116.52	116.45	116.39	116.32	116.26	116.19	116.13	116.06	116.00	115.93
30	112.71	112.65	112.59	112.52	112.46	112.40	112.34	112.28	112.22	112.16

# TELESCOPE.

TABLE V.—*continued.*

True Angle.	40"	41"	42"	43"	44"	45"	46"	47"	48"	49"
1'	2062.62	2042.2	2022.1	2002.54	1983.28	1964.4	1945.85	1927.68	1909.82	1892.31
2	1289.13	1281.13	1273.22	1265.41	1257.7	1250.06	1242.55	1235.10	1227.75	1220.47
3	937.55	933.27	929.15	924.94	920.81	916.72	912.66	908.64	904.65	900.72
4	736.65	734.03	731.43	728.83	726.27	723.72	721.19	718.69	716.18	713.71
5	606.65	604.87	603.1	601.35	599.6	597.86	596.12	594.41	592.71	591.01
6	515.65	514.36	513.00	511.81	510.55	509.29	508.04	506.78	505.52	504.30
7	448.40	447.42	446.45	445.49	444.53	443.57	442.62	441.67	440.73	439.79
8	396.66	395.88	395.12	394.37	393.63	392.88	392.13	391.38	390.64	389.90
9	355.62	355.01	354.40	353.79	353.18	352.56	351.93	351.35	350.78	350.18
10	322.28	321.78	321.28	320.78	320.28	319.79	319.29	318.79	318.30	317.81
11	294.66	294.24	293.82	293.40	292.98	292.56	292.15	291.73	291.32	290.92
12	271.40	271.04	270.68	270.32	269.97	269.62	269.28	268.93	268.59	268.23
13	251.54	251.24	250.93	250.62	250.32	250.02	249.71	249.41	249.11	248.81
14	234.38	234.11	233.84	233.57	233.31	233.05	232.79	232.53	232.27	232.01
15	219.43	219.19	218.96	218.72	218.49	218.26	218.03	217.80	217.57	217.34
16	206.26	206.05	205.85	205.64	205.44	205.23	205.03	204.82	204.62	204.41
17	194.58	194.40	194.22	194.03	193.85	193.67	193.49	193.31	193.13	192.95
18	184.16	183.99	183.83	183.67	183.51	183.34	183.18	183.01	182.85	182.69
19	174.79	174.64	174.49	174.34	174.20	174.05	173.91	173.76	173.62	173.47
20	166.34	166.20	166.07	165.94	165.81	165.67	165.54	165.41	165.28	165.14
21	158.66	158.54	158.42	158.29	158.17	158.05	157.93	157.81	157.69	157.57
22	151.66	151.54	151.43	151.32	151.21	151.10	150.99	150.88	150.77	150.66
23	145.25	145.14	145.04	144.94	144.84	144.74	144.64	144.54	144.44	144.34
24	139.36	139.26	139.17	139.09	138.99	138.89	138.80	138.70	138.61	138.52
25	133.93	133.94	133.86	133.67	133.59	133.50	133.42	133.33	133.25	133.16
26	128.91	128.82	128.74	128.66	128.58	128.49	128.41	128.33	128.25	128.18
27	124.25	124.17	124.10	124.02	123.95	123.88	123.80	123.72	123.65	123.58
28	119.92	119.85	119.78	119.71	119.64	119.57	119.50	119.43	119.36	119.29
29	115.87	115.80	115.74	115.67	115.61	115.54	115.48	115.42	115.36	115.29
30	112.10	112.04	111.98	111.91	111.85	111.79	111.73	111.67	111.61	111.55

# TELESCOPE.

TABLE V.—*continued.*

True Angle.	50"	51"	52"	53"	54"	55"	56"	57"	58"	59"
1'	1875.11	1858.21	1841.62	1825.32	1809.3	1793.6	1778.12	1762.92	1747.95	1733.29
2	1213.3	1206.2	1199.2	1192.24	1185.42	1178.64	1171.93	1165.3	1158.77	1152.30
3	896.8	892.9	889.06	885.24	881.46	877.72	873.97	870.30	866.65	863.02
4	711.25	708.8	706.37	703.96	701.57	699.18	696.81	694.49	692.15	689.83
5	589.32	587.64	585.96	584.30	582.65	581.02	579.38	577.76	575.15	574.55
6	503.08	501.85	500.63	499.42	498.22	497.02	495.82	494.63	493.45	492.27
7	438.86	437.92	436.98	436.07	435.15	434.24	433.32	432.42	431.51	430.61
8	389.17	388.44	387.71	386.98	386.25	385.54	384.81	384.10	383.39	382.67
9	349.59	348.99	348.41	347.82	347.25	346.66	346.08	345.49	344.92	344.34
10	317.32	316.83	316.35	315.85	315.38	314.90	314.42	313.94	313.47	312.99
11	290.51	290.07	289.68	289.28	288.88	288.47	288.07	287.67	287.27	286.87
12	267.87	267.52	267.18	266.83	266.49	266.15	265.81	265.46	265.12	264.78
13	248.51	248.21	247.91	247.61	247.31	247.02	246.72	246.42	246.13	245.83
14	231.75	231.49	231.23	230.97	230.72	230.47	230.22	229.96	229.70	229.44
15	217.12	216.89	216.66	216.43	216.21	215.98	215.75	215.52	215.30	215.08
16	204.21	204.00	203.80	203.60	203.40	203.21	203.01	202.81	202.61	202.41
17	192.77	192.59	192.41	192.23	192.05	191.87	191.69	191.51	191.33	191.15
18	182.53	182.37	182.21	182.05	181.89	181.73	181.57	181.41	181.25	181.09
19	173.33	173.18	173.04	172.89	172.75	172.60	172.46	172.31	172.17	172.03
20	165.01	164.88	164.75	164.61	164.48	164.35	164.22	164.09	163.96	163.83
21	157.45	157.33	157.21	157.09	156.97	156.85	156.73	156.61	156.49	156.37
22	150.55	150.44	150.33	150.22	150.11	150.01	149.90	149.79	149.68	149.57
23	144.24	144.14	144.04	143.94	143.84	143.74	143.64	143.54	143.44	143.34
24	138.43	138.33	138.24	138.15	138.06	137.96	137.87	137.78	137.69	137.60
25	133.07	132.98	132.90	132.81	132.73	132.64	132.56	132.47	132.39	132.31
26	128.10	128.03	127.95	127.87	127.79	127.71	127.63	127.56	127.48	127.41
27	123.51	123.43	123.35	123.28	123.21	123.13	123.06	122.98	122.91	122.84
28	119.22	119.16	119.09	119.02	118.95	118.88	118.81	118.74	118.67	118.60
29	115.23	115.17	115.11	115.04	114.98	114.91	114.85	114.78	114.72	114.66
30	111.49	111.43	111.37	111.31	111.25	111.19	111.13	111.07	111.01	110.95

# TELESCOPE.

*Construction and Use of the Tables.*—We have already explained the construction and use of Tables I. and II., which are required to be adapted to the particular telescope with which any given micrometer is used; and we have also explained how the value of a single division, or turn of a screw, is ascertained by means of the sun's diameter: but this method gives a derivative rather than an original independent value to the micrometrical scale; for if the sun's diameter be not truly given in the Nautical Almanac (and the late Dr. Maskelyne had reason to alter it in the latest years of his life), the error of this measure will be introduced into the scale derived from it; Table III. is therefore inserted, as affording the ready means of obtaining an independent scale from actual terrestrial measurement. We have already shewn how the table of corrections is constructed in this table; and the reader will have no difficulty in taking out the proper numbers, as corrections to be added to the true angle, in order to convert it into the apparent or measured angle, if he be careful to take the minutes of the given angle from the left-hand vertical column, and the seconds from the horizontal line at the top; for in every instance, the meeting of the two columns will contain the additive quantity that is to be applied to the true angle, in order to obtain what the telescope will give when the value of its scale is once duly assigned. For instance, suppose the true angle  $14' 20''$ , where  $14'$  is taken at the side, and  $20''$  at the top, the junction of the two columns gives  $+ 6''.28$ , which shews that this quantity must be added to  $14' 20''$ , the true angle, to make  $14' 26''.28$ , the apparent angle, as measured by a telescope of 63.5 inches focal length. If now this angle, reduced into seconds, be divided by the turns of the screw, or divisions on any scale used as a micrometrical scale, the quotient will be the value in seconds of one turn, or division, as the case may be, provided the angle in question be that which a true yard actually subtends at a known distance. For example, when a yard of 36 exact inches was erected at the distance of 190.98 yards, the micrometer of Troughton, attached to Tulley's 63.5 inch telescope, measured it by 34.78 revolutions of its screw; and by Table V. the true angle, read as in Table III. at the side and top, corresponding to this distance, is  $18' 0''$ ; the additive quantity belonging to this angle, as taken from Table III., is  $+ 9''.89$ ; and therefore the apparent angle, if measured by the said telescope, would be  $18' 9''.89$ ; therefore  $\frac{18' 9''.89}{34.78} = 31''.33$  is the value of

one revolution of the screw, which is very nearly the same as was determined from the sun, and before tabulated. This coincidence of the celestial and terrestrial measures affords a convincing proof that the scale has been duly appreciated.

We have said, that this table of corrections, and also the following one, which we shall explain presently, are computed exclusively for a telescope of 63.5 inches focus, being that which is represented, with a Troughton's micrometer attached, in *fig. 6. of Plate XXIX.*; and that each different telescope ought to have its own tables of corrections corresponding to its focal length, which limitation is required by the theorem on which we have grounded our calculations. But as the *distance*, which is the varying term, is the same for all telescopes, we find that in practice the corrections of any other telescope will be so nearly proportionate to their respective focal lengths, that they may be taken exactly as such, without any sensible error; that is, the error arising from the table of corrections will be always as small as the error of observation in ordinary telescopes, unless the distance be very small, and its correction consequently great. On this account, Table III., and also Table IV., which, it will be

seen, is derived from it, like Table V., may be considered as *general tables*, admitting of proportional parts of their whole corrections to be taken as suitable corrections for telescopes of other dimensions. This consideration is of great importance, with respect to the general utility of our tables of correction; and therefore the reader shall not depend solely on the authority of our bare assertion. We have already computed the correction for a telescope of 63.5 inches focal length, to be added when the true angle is  $34' 59''.4$ , or distance 100 yards, and found it  $37''.68$ ; let us see what it will be with the same data, when the telescope has just one half of the said focal length: here we have

$$\frac{1.764}{2} = .882 \text{ of a yard for the focal length; then}$$

$$\frac{.882 \times .882}{100 - 882} = \frac{.77924}{99.118} = .00785 = e, \text{ the elongation of}$$

$$\text{the focus, and } \frac{.882 \times .00785 \times 34'.99}{.882} = 35'.3, \text{ or } 35' 18''$$

for the apparent angle, from which, if we subtract  $34' 59''.4$ , the true angle, the difference  $18''.6$  will be the corresponding correction, which differs only a quarter of a second from  $\frac{37''.68}{2}$ , or half the correction of the telescope of

double dimensions. Beyond 100 yards distance, the error, small as it is, will continue to diminish as the distance increases, and a smaller distance will seldom require to be measured in this way. The accuracy of this conclusion has been still farther corroborated by actual experiment: a graduated staff was placed erect at a distance, by measurement of a Troughton's chain of five-foot links, of 261.9 yards, and the two telescopes of 63.5 and 45.75 inches focal length, were tried against each other thus; a yard by the first was found, with Troughton's micrometer, to be equal to 25.33 turns; and by the second, with the same instrument, to be 18.19; the true angle belonging to this distance by Table V. is  $13' 7''.54$ ; and the correction for the larger

telescope by Table III.  $+ 5''.25$ ; therefore, taking  $\frac{45.75}{63.5}$  or  $.72$  of  $5''.25 = 3''.8$  for the correction of the smaller telescope, we have the following values of the respective scales; *viz.*  $\frac{13' 7''.54 + 5''.25}{25.33} = 31''.2984$ , &c. and

$$\frac{13' 7''.54 + 3''.8}{18.19} = 43''.504, \text{ which values accord very}$$

nearly with those that had been previously determined by a series of solar measures, and the latter of them exactly, as far as to the third place in the decimal figures.

Table IV. is the table to be used with Table V. for finding, first the true angle from the apparent one, and then the true distance at once from this true angle: its corrections are arranged somewhat differently from those in Table III., and have an opposite sign, but are borrowed from Table III. in such way, that by means of a little transposition, the terms of one may be converted into those of the other; as, for example, at the apparent angle  $18' 40''$ , in Table IV., the correction is  $- 10''.4$ , and the true angle consequently  $18' 29''.6$ ; and at  $18' 30''$ , the nearest numbers for the true angle in Table III., the correction is  $+ 10''.44$ , which makes its corresponding apparent angle  $18' 40''.44$ . In the former of these two tables, the correction is calculated to the hundredth part of a second; it being that from which the scale has its value appreciated; but in the latter, it was deemed convenient to leave out the hundredth parts, as being

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being beyond the powers of the telescope, or rather of the human eye, when a single observation is taken.

Before Table V. was constructed, it was found by plane trigonometry, that one yard will subtend an angle of one minute at 3437.7 yards distance; and, as the distance decreases in the same ratio in which the angle increases, the table was made by a continual reduction of this number into halves, thirds, fourths, &c. as far as to 30', and all the intermediate seconds from 1' to 30', were inserted with their corresponding distances. For instance, at the true angle of 18' 30'', the true distance is 185.82 yards; it being always understood, that the measured angle is subtended by an exact yard placed at right angles to the line of sight, in either a vertical or horizontal position, and that the correction taken from Table IV. has been applied to the measured or apparent angle. If two yards should be used as the opposed object at a great distance, then *half* the angle only must be taken; but if half a yard only be used at small distances, then *double* the angle will be proper; and should the distance be within 110.95 yards, the smallest distance contained in the table; in which case the angle will exceed 30': the distance belong-

ing to *half* the angle will always be *double* the distance required. Suppose the angle 33'; then half of this is 16' 30'', and the double number 208.34; consequently 104.17 yards will be the corresponding distance; and thus the table will extend to any short distance, by taking a given portion of the measured angle, when reduced to the true one, and by using the same portion of the corresponding distance, provided the angle do not exceed 60', which is the limit of Table IV., and which is as much as a telescope magnifying only 30 times will usually take into the field of view.

In order to exemplify the use of these new tables, and at the same time to prove their accuracy, we obtained from Mr. Troughton a couple of staves, having each a sliding yard of brass, cut into notches for decimal divisions of a yard, which are capable of being seen at a distance, with an apparatus for placing them perpendicular in any given situation; on the 8th of October 1816, one of these staves was fixed in a perpendicular position at an unknown distance on level ground, and the following measures were taken of the angle subtended by a yard, by Troughton's micrometer successively adapted to each of the four telescopes, thus:

With telescope	30.15 in.	24.59 revol.	= 27	2.9 (by Tables I. and II.)	= 10.4 (by Table IV.)	= 26	52.5	
	45.75 in.	37.53 revol.	= 27	10.5	= 15.6	= 26	54.9	
	63.5 in.	52.25 revol.	= 27	15.43	= 21.85	= 26	53.58	
	118.8 in.	98.52 revol.	= 27	35.1	= 41.0	= 26	54.1	
							4)	215.08
Average =								26 53.77

By Table V. the distance corresponding to this angle is 127.81 yards, and by measurement of a good chain, it was afterwards found to be  $5.808 \times 22 = 127.776$  yards, the difference or error being only .034 of a yard, or something less than an inch and a half. During the observations, the sun was obscured by clouds, and the object viewed had no vibratory motion, which is a circumstance essential to be attended to.

With Dollond's divided object-glasses applied to the telescope of 45.75, the measure was 2 in. 11 div. 19 ver., or  $2.94$  of the vernier, which, multiplied by  $1''.24$ , the solar

value of unity, gave the measured angle only  $26' 44''.56$ ; but on examining the ratio in which the focus elongates at different distances, we found that the divergence of the rays was lessened so much, in passing through the divided object-glasses, before they entered the achromatic object-glasses, that the table of corrections would be of no use for this arrangement of two separate object-glasses.

On the 16th of the same month the graduated staff was erected at a greater unknown distance, and the following measures were taken by Troughton's micrometer, as before, viz.

With telescope	45.75 in.	27.59 revol.	= 20	0.1	- 8.6 (correction)	= 19	51.5	
	63.5 in.	38.48 revol.	= 20	4.4	- 12	= 19	52.4	
							2)	103.9
Average =								19 51.95

to which angle the corresponding distance by Table V. is 173.0 yards; and the subsequent measure by the chain accurately repeated was 172.92 yards, in which determination the error was .08 of a yard, or 2.88 inches only.

From these operations we are persuaded that a good telescope, with a Troughton's micrometer, will determine distances, by simple inspection, when within the eighth part of a mile, with more accuracy than is usually done by a surveyor's chain or measuring-wheel; and, consequently, if both a backward and forward view be taken from one station, situated near the middle of a line joining two graduated staves, a *quarter of a mile* may be so determined at *one station* in the space of two or three minutes after the station is taken. But it may be said, why not take a quarter of a mile at one sight, since the power of a good telescope will command a small object at this distance? To which we answer, that the error arising from distance

may be considered rather as a geometrical than an optical error: our experiments have convinced us that a small angle may be measured by Troughton's micrometer, when the thickness of the spider's line is allowed for, (*viz.*  $\frac{1}{8}$ th of a turn of the screw in our micrometer,) so accurately, that the error of observation in favourable weather will seldom exceed *one second*; but the error in distance, corresponding to an error of one second in the measured angle, increases in the duplicate ratio of the distance, and consequently becomes too considerable to be admissible beyond a limited distance; for instance, at the distance of 220 yards, or the eighth of a mile, an error of 1" in the angle subtended by a yard produces only an error of 0.23 of a yard in distance; but at 440 yards, or a quarter of a mile, the error in distance corresponding to the same error in the angle is 0.92; that is, at twice the distance the geometrical error is four times augmented; which circumstance limits

limits the distance at which micrometrical measurements in longimetry can be usefully employed at one station. What may be called the *optical error*, or that which arises from want of parallelism in the rays of light on entering the object-glass, and is allowed for in our fourth table, on the contrary, decreases with an increase of distance, and very nearly in a sub-duplicate ratio; so that the correction arising out of this optical error becomes insensible at no very great distance in telescopes of ordinary dimensions: for instance, at 220 yards, or its angle  $15' 38''$ , the correction is  $- 7''.4$  by our Table IV.; but at 440, or its angle  $7' 49''$ , the correction diminishes to  $1''.9$ , or nearly a fourth of the former at double the distance. Hence there is a peculiar distance at which every separate telescope will have its optical error or correction reduced to  $1''$ , or quantity of probable error of observation, beyond which distance the tabulated corrections may be disregarded in ordinary operations. With the telescope of 63.5 inches focus, the correction will be less than  $1''$  at 590 yards distance; with that of 45.75 inches, at 537; and with that of 30.15 inches, at 430, the distance continuing to diminish with the diminishing length of the focus of each object-glass, but not in the same ratio; consequently, when the telescope is very short, and its power small, the optical error may be altogether disregarded, wherever such telescope can be of any real use; because, in all probability, this error will be less than the error of observation arising from want of power.

*TELESCOPE Shell*, in *Conchology*, the name of a species of turbo, with plane, striated, and numerous spires.

**TELESCOPICAL STARS**, such as are not visible to the naked eye, but discoverable only by the help of a telescope. See **STAN**.

All stars less than that of the sixth magnitude are telescopic to a middling eye.

**TELESE**, in *Geography*, a town of Naples, in Lavora, the see of a bishop, who resides at Cerreto; 18 miles E.N.E. of Capua. N. lat.  $41^{\circ} 12'$ . E. long.  $14^{\circ} 32'$ .

**TELESIA**, or **TELESSIA**, in *Ancient Geography*, a town of Italy, in Samnium.

**TELESIA**, in *Mineralogy*. See **CORUNDUM**.

**TELESIO**, **BERNARDINO**, in *Biography*, a modern philosopher, the descendant of an illustrious family at Cosenza, in Naples, was born in the year 1508 or 1509. Having received the early part of his education under an uncle at Milan, he accompanied him to Rome in 1525, and shared in the calamities which attended the sack and pillage of that city. At Padua, whither he afterwards removed, he applied himself with diligence to the study of mathematics and philosophy. Returning again to Rome, he formed an intimate acquaintance with several persons of distinguished character, and so much ingratiated himself with pope Pius IV. that he was offered the archbishopric of Cosenza, which he declined for himself and obtained for his brother. From Rome he retired to his native country, where he married in advanced age, and for a short time became professor of philosophy in the university of Naples. However, the place of his more constant residence was Cosenza, and here he established an academy called Cofentina. He passed the remainder of his life under the patronage of several persons of distinction, particularly Ferdinand, duke of Nocera; but afflicted by the assassination of one of his sons, and by the calumnies circulated against his school of philosophy, he terminated his life in the year 1588. Tesio distinguished himself by his opposition to the physics of Aristotle, and employed mathematical principles in explaining the laws of nature. These were first divulged in a work printed at Rome in 1565, entitled "De Rerum Natura juxta propria

principia, Lib. II." and enlarged to nine books in an edition printed at Naples in 1586. The same system was maintained in other treatises, under the titles of "De his quæ in Aere fiunt, et de Terræ Motibus;" "De Mari;" "De Colorum Genere," &c. His system was in its essence the doctrine of Parmenides, who taught, that the first principles in nature, by means of which all natural phenomena are produced, are cold and heat. (See **PARMENIDES** and **ELEATIC**.) Tesio's theory is thus developed: "Matter, which is in itself incapable of action, and admits neither of increase nor diminution, is acted upon by two contrary incorporeal principles, heat and cold. From the perpetual opposition of these, arise the several forms of nature: the prevalence of cold in the lower regions producing the earth and terrestrial bodies, and that of heat in the superior regions, the heavens and celestial bodies. All the changes of natural bodies are owing to this conflict; and according to the degree in which each principle prevails, are the different degrees of density, resistance, capacity, moisture, dryness, &c. which are found in different substances." This system is founded on the fanciful conversion of mere attributes and properties into substantial principles. For lord Bacon observes, that Tesio, no less than Plato and Aristotle, places abstract notions at the basis of his system, and produces his world of real beings from non-entities. This eminent philosopher, however, characterises him as a lover of truth and a benefactor to science; and one who prepared the way for subsequent improvements. After his death, his writings, as containing "innovations," were put into the Index Expurgatorius of the Inquisition. His philosophy, nevertheless, had many advocates, among whom was Campanella; and his works were republished at Venice, in 1590, by Antonio Persio, who wrote a compendium of his philosophy in the vernacular tongue. Tesio's style was more polished than that of other philosophers of his time; and he intermixed some Latin verses of considerable eloquence. Brucker by Enfield.

**TELESPHORUS**, in *Mythology*, a deity invoked by the Greeks for health, together with Esculapius and Hygeia. The figures of these three divinities occur on several medals; and on some we have Telephorus with Esculapius alone, and on others with Hygeia.

The figure of Telephorus is invariably the same, viz. that of an infant clothed with a sort of cloak without sleeves, which enfolds its arms, descends below the knees, and has a kind of hood or cowl covering its head.

Montfaucon has given a particular description of this deity, the worship of which is supposed to have passed from Epidaurus to Rome, with that of Esculapius.

**TELETÆ**, among the *Ancients*, were solemn rites performed in honour of Isis.

**TELETZKOI-OZERO**, in *Geography*. See **ALTIN**.

**TELETZKOI Mountain**, deriving its name from the lake Teletzkoi-ozero, one of the greatest eminences of the Altay mountains (see **ALTAI**), and from which the river Oby issues. It forms, with its lofty summits, the boundary between Siberia and the Soongarey, strikes its powerful ridges down between the lake and the Katunia; and after having turned round the east side and the lake, unites with the Kunetzkoï mountains. This division is one of the greatest, but at the same time the coldest and most inaccessible, of all the Altai ore-mountains; hence it is, that its quality and contents are little known. This, however, is certain, that very powerful granite and porphyry mountains are in its range, and that the earth near and upon it yields jasper, flint breccia, hornschistus, white (probably saline) chalk-stone, coloured marble, black schistus, marle, sand-stone, and in these

these there are iron, argentaceous copper, and lead ores, naphtha, asphaltus, &c. The mountains to the right of the Katunia seem to be particularly rich in ores.

**TELEUTES**, or **TELENGUTES**, a tribe of Tartars, who are supposed to have derived their name from the lake Telegul in the Altay mountains. They are also denominated by the Russians the white Kalmucks, because they formerly lived among the Soongarians. Abulgasi reckons them among the Mongolian races; but as their speech is manifestly a corrupt Tartarian, their origin may more consistently be derived from that nation. In the year 1609 they did homage for the first time to the Russian empire; but it was not till towards the middle of the 17th century, when some stems of them removed higher up the Tom, that they became properly subjects of Russia: the greater part of them, however, remained with the Kalmucks. The former dwelt partly in the Tomskoi district of the Tobolskian, partly in the Kufnetskian circle of the government of Kolhyvan; and their number is so small, that they only reckon about 500 males.

**TELS**, a town of the county of Tyrol, near the Inn; 15 miles W.S.W. of Innsbruck.

**TELGEN**, a town of Sweden, in Sudermanland, on the lake Mæler; 15 miles S.W. of Stockholm.

**TELGET**, a town of Germany, in the bishopric of Munster; 5 miles E.S.E. of Munster.

**TELGHIOURAN**, a town of Asiatic Turkey, in the government of Diarbekir; 30 miles S. of Diarbekir.

**TELHEIM**, a town of the duchy of Wurzburg; 7 miles S.S.W. of Schweinfurt.

**TELHEIRO**, a town of Portugal, in the province of Beira; 6 miles S.W. of Pinhel.

**TELICA**, a volcano of Mexico, near Tecoaatepeque.

**TELICARDIOS**, in *Natural History*, the name given by some authors to a stone found in the shape of a heart. It owes this figure to its having been found in the shell of some large bivalve of the cockle kind; and is more usually known among authors under the name of bucardites.

**TELIGUL**, or **TELEGUL**, in *Geography*, a lake of Russia, in the Altay mountains, about 120 miles in circumference. N. lat. 43° 12'. E. long. 64° 14'.

**TELIPHANO**, in *Botany*, a name used by some authors for the doricum, or leopard's bane.

**TELL**, **WILLIAM**, in *Biography*, a celebrated Swiss, was an inhabitant of middle rank of Burgeln, in the canton of Uri, and son-in-law of Walter Furst. In 1307 he engaged in the conspiracy against the Austrian tyranny. Gesler, the German bailiff, suspecting a plot, artfully contrived a scheme for ascertaining the extent of submission to the Austrian yoke. Accordingly he set up a hat upon a pole, and commanded that obedience should be paid to it. Tell resisted the command; and, as tradition reports, the arbitrary bailiff ordered him to shoot with an arrow at an apple placed on the head of his son. He cleft the apple without hurting the child; and being observed to have another arrow, he was interrogated what he intended to do with it. He unhesitatingly replied, that if he had wounded his son, the other shaft should have been directed to the bailiff's heart. This bold declaration caused him to be imprisoned. Of this fact there is no doubt; though the incident of the arrow and apple may be fabulous, as it is applied by Saxo Grammaticus to a Dane at an earlier period. The bailiff took Tell with him across the lake of Lucern, designing to convey him to another canton. In the passage, a storm arose; and the vessel being in danger, the fetters of Tell who was known to be a skilful boatman, were taken off, and the helm was committed to his hands. Availing himself of this circumstance, he steered to a rock and made his escape. Gesler on landing met with his fate from an arrow

of Tell, who afterwards retired to Stauffacher in the canton of Schweitz; and on the following new-year's day, all the Austrian governors were seized and dismissed from the country; and this circumstance is said to be the commencement of Swiss freedom. Tell's death is supposed to have been occasioned by an inundation at Burgeln in the year 1354. His grateful countrymen erected a rude chapel to his honour on the spot where he resided, and another upon the rock on which he landed. His posterity, however, sunk into oblivion, without any permanent distinction; the last who bore his name died in 1684, and the last of the female line in 1720. Coxe. Muller. Gen. Biog.

**TELLA PASHNUM**, in *Natural History*, a name given by the people of the East Indies to a kind of white arsenic, or rat's-bane, found native among them.

It is well known to be a fatal poison, and used to destroy vermin. It lies in the cliffs of rivers among strata of stone in large white irregular lumps; when held to the fire, it emits copious fumes, smelling strongly of garlic and sulphur, but it does not readily melt or run.

**TELLA Sagrum**, a name given by the natives of the East Indies to a kind of earth which they use externally to dry up ulcers, and internally in cases of coughs and colds. It is of the nature of the finer clays, and is found at the bottom of some of their rivers.

**TELLEGROD**, in *Geography*, a morass on the borders of Norway and Lapland, which cannot be crossed without much apprehension of danger. During winter it is frozen to the depth of several yards, and does not thaw till the summer is far advanced. The surface may appear dry and solid, but as the heat still penetrates downwards, the icy floor which supports it, softening and melting, bends and trembles under the shock of pressure, and at last gives way, so that horses, carriages, and passengers—all sink into the abyss. Near the mouth of the Fiord, or firth, a bed of clay-marle is seen distinctly mixed with small shells. Appearances of a like kind occur along the southern shores of Norway, and the fact is the more remarkable, since no fossil shells have been ever found in the interior of the country. This marle, however, is only a local formation, and rests on the fundamental gneiss.

**TELLER**, an officer in the exchequer, of whom there are four: whose business is to receive all monies due to the crown, and thereupon to throw down a bill through a pipe into the tally-court, where it is received by the auditor's clerks, who attend there to write the words of the said bill upon a tally, and then deliver it to be entered by the clerk of the pells, or his clerk.

The tally is then split or cloven by the two deputy chamberlains, who have their seals; and while the senior deputy reads the one part, the junior examines the other part with the other two clerks.

The tellers' places are in the king's gift, and they have besides their chief clerk or deputy, and other clerks for the dispatch of business.

**TELLER, MARCUS**, in *Biography*, a priest and musical composer in the church of St. Gervais, in Maestricht, published in 1726, his first work at Augsburg, under the title of "Musica sacra stylo plane Italico et Chromatico pro Compositionis amatoribus, complectens IX Motetta brevia de Tempore, et II Missas solemnes, &c." His second work was posthumous, and published likewise under the solemn title of "Musica sacra," consisting of four masses and four motets, for four voices, two violins, tenor, bassoon, and a basso continuo, or figured base.

**TELLER, FLORIAN**, an eminent dramatic composer of the music of grand opera ballets. In 1763 he composed music for the ballet of Orpheus and Euridice, for the

duke of Wurtemberg's theatre at Stuttgart; and the year after, for his highness's birth-day, that of Noverre's grand ballet called "The Triumph of Neptune." The ballet music of this composer superceded that of Lulli and Rameau at Paris; and in our opera, the music of the *ballets historiques*, and chaconnes danced by Mad. Heinel and Vestris, was chiefly the production of Teller.

TELLES, in *Geography*, a sea-port of Africa, in the kingdom of Fez, on the coast of the Mediterranean; the harbour is small but safe, and the bottom good; 120 miles E.S.E. of Tangiers.

TELLICHERY, a city of Hindoostan, on the coast of Malabar, belonging to the English, and defended by lines. It was long besieged by the forces of Hyder Ali; but in the year 1782 the troops were defeated, the camp taken, and the general wounded and made prisoner by the British, under the command of major Abingdon. The situation of the town is beautiful and healthy: pepper is the great article of trade, and cardamoms; 48 miles N.N.W. of Calicut. N. lat.  $11^{\circ} 15'$ . E. long.  $75^{\circ} 20'$ .

TELLICO, a town of the state of Tennessee, with a block-house; 50 miles S.W. of Knoxville. N. lat.  $35^{\circ} 37'$ . E. long.  $84^{\circ} 18'$ .

TELLIER, MICHAEL, in *Biography*, a distinguished Jesuit, was born in 1643, near Pire, in Lower Normandy. He studied at the Jesuits' college at Caen, and entered into the society at eighteen years of age. Having for some time taught the schools, he was directed by his superiors to prepare an edition of Quintus Curtius, "in usum Delphini," which was printed in 1678. He was afterwards selected, with other eminent brethren, to establish at the Jesuits' college at Paris a society of learned men, who might retrieve the honour of the body; but his views were directed to other objects, and he became a zealous controversialist in the subjects of dispute between the Jesuits and other orders. Accordingly, in 1687, he published "Defense des Nouveaux Chretiens et des Missionnaires de la Chine, du Japon, et des Indes," which was attacked by Arnauld in his "Morale Pratique," and was announced to the holy office: and sentence of condemnation was averted by a promise that Tellier should come to Rome, and make alterations in his work. This prepared the way for numerous publications; in consequence of which Tellier gained increasing reputation, and was advanced to the offices of revisor, rector, and provincial. Upon the death of F. la Chaize in 1709, he was chosen, in competition with another candidate, and in consequence of an assumed air of modesty, to succeed him as confessor to the king. But whatever modesty he might assume to serve a present purpose, he had little true humility. Ardent, unsympathizing, and despotic, he was hated by his brethren over whom he tyrannized, in the most unwarrantable manner. Fontenelle, who well knew his disposition and character, hearing of his appointment, said, "The Jesuits have finned." His first act was the demolition of the famous house of Port Royal, which he razed to its foundation; he then forced upon the nation and the magistrates the bull Unigenitus; and he proceeded with such violence, that the Jesuits themselves said, "Father le Tellier drives us at such a rate that he will overturn us." Tellier's conduct brought disgrace on the society, and was ultimately the chief occasion of its abolition. On the death of Louis XIV. he was exiled, first to Amiens, and afterwards to La Flèche, where he died in 1719, at the age of seventy-six. The morals of Tellier were regular; and though some persons suspected him of hypocrisy, others have with greater probability believed, that he was actuated by real zeal for the principles which he had adopted. He was a man of literature, wrote many works, and was a member of

the Academy of Belles Lettres. Nouv. Dict. D'Alentbert's Hist. of the Jesuits.

TELLIGT, in *Geography*, a town of Germany, in the bishopric of Munster, with a rich abbey, on the Ems; 3 miles from Munster.

TELLIGUO MOUNTAINS, or *Iron Mountains*. See IRON MOUNTAINS.

TELLINA, in the Linnæan system of *Conchology*, a distinct genus of the class of Vermes, and order of Testacea. For the characters of this genus, see CONCHOLOGY. Gmelin enumerates ninety-one species.

TELLINGANA, in *Geography*, a province of Hindoostan, now called Golconda.

TELLINGSTEDE, a town of the duchy of Holstein; 11 miles S.E. of Lunden.

TELLIPOLI, a town on the N. coast of the island of Ceylon; 9 miles N. of Jaffnapatam.

TELLO, a town on the W. coast of the island of Celebes, and capital of a small kingdom, once united to Macassar. S. lat.  $5^{\circ}$ . E. long.  $120^{\circ} 2'$ .—Also, a town on the W. coast of the island of Lomboek. S. lat.  $8^{\circ} 24'$ . E. long.  $115^{\circ} 45'$ .

TELLO *Langue*, a town on the W. coast of Sumatra. N. lat.  $0^{\circ} 51'$ . E. long.  $98^{\circ} 21'$ .

TELLO *Point*, a cape on the W. coast of Sumatra. S. lat.  $1^{\circ} 50'$ . E. long.  $100^{\circ} 31'$ .

TELLONIUM. See THELONIUM.

TELLONUM, in *Ancient Geography*, a place of Gaul, in Aquitania, near the sea-coast, S.E. of Burdigala.

TELOW, in *Geography*, a town of Brandenburg, in the Middle Mark, famous for its turnips; 10 miles S. of Berlin. N. lat.  $52^{\circ} 23'$ . E. long.  $13^{\circ} 15'$ .

TELLUDOPIN, a town of the island of Celebes, in Buggefs bay. S. lat.  $2^{\circ} 35'$ .

TELLURE, in *Agriculture*. See TILLER.

TELLURIUM, in *Mineralogy*, a metal discovered by Klaproth, combined with gold and silver, in the ores from the bannat of Temeswar, and in the Farzebay mountains in Transylvania. The ores of this metal are denominated *native tellurium*, *graphic tellurium*, *yellow tellurium*, and *black tellurium ore*.

*Native Tellurium*; *Gedigen Sylvan*, Werner.—The colour is intermediate between tin and silver white, and sometimes inclines to steel-grey. This ore is found massive and disseminated; it is said sometimes to occur crystallized in four-sided prisms; it occurs also in small granular concretions. It yields to the knife, and is rather brittle. The specific gravity, according to Klaproth, is 6.15. Before the blow-pipe, native tellurium melts easily before ignition; it burns with a greenish flame, and is entirely volatilized in a dense white vapour, which has the acrid odour of horse-radish. When exposed to a low heat, it is converted into a yellowish or blackish oxyd: by an increase of temperature it forms a dark brown or black glass, in which gold grains are interspersed: at a still higher heat the oxyd is entirely volatilized. The constituent parts are, according to Klaproth,

Tellurium	-	-	-	-	92.55
Iron	-	-	-	-	7.20
Gold	-	-	-	-	.25

The proportion of gold is however variable. In one variety of native tellurium, Klaproth found 9 parts in the 100 of gold. Native tellurium occurs in veins with quartz and lithomarge. It is known, in the older works on mineralogy, by the name of *aurum problematicum*, *aurum paradoxicum*, and *white gold ore*.

*Graphic Tellurium*; *Tellure natif graphique*, Haüy.—This is worked as an ore of gold at Offenbanya, in Transylvania,

# TELLURIUM.

where it has hitherto only been found. It is so called, from the particular appearance formed by the aggregation of the crystals; it occurs in veins in porphyry. The colour of graphic tellurium is steel-grey, which is sometimes variously tarnished by exposure to the air: it is also found white, yellow, or lead-grey. It has a shining metallic lustre. It occurs massive, disseminated in leaves, and crystallized in small compressed hexahedral prisms, either with or without tetrahedral summits, and generally arranged in rows on the surface of quartz. There are frequently other prisms attached to the extremities of the former, at right angles with them, giving the whole row an appearance of Persepolitan characters. The planes of the crystals are smooth. "The massive variety, which is very rare, occurs in granular distinct concretions." (Jamefon's Min.) It is soft, brittle, and frangible, and yields a lead-grey streak. The specific gravity is 5.723. Before the blow-pipe it burns with a green flame, and is volatilized. The constituent parts, according to Klaproth, are

Tellurium	-	-	-	-	-	60
Gold	-	-	-	-	-	30
Silver	-	-	-	-	-	10

*Yellow Tellurium Ore.*—The colour of this ore is silver-white, passing into yellowish or brass-white and grey. It occurs in grains, and in minute compressed four-sided prisms, with a lamellar structure and bright metallic lustre: it also occurs massive and reticulated: it is soft and somewhat sectile: the specific gravity is 10.878. The constituent parts, according to Klaproth, are

Tellurium	-	-	-	-	-	44.75
Gold	-	-	-	-	-	26.75
Lead	-	-	-	-	-	19.5
Silver	-	-	-	-	-	8.5
Sulphur	-	-	-	-	-	5

This ore, which is worked for the gold and silver it contains, has hitherto been found only at Nagyag, in Transylvania. It occurs in small irregular veins in porphyry. The most frequent vein-stones are brown spar and quartz: it is sometimes associated with red manganese ore, sulphuret of manganese, native arsenic, plumose antimony, and native gold.

*Black Tellurium Ore; Nagyagerz, Werner.*—The colour of this ore is between iron-black and dark lead-grey. It occurs massive and in leaves, and also crystallized, in the following forms; oblique four-sided tables, rectangular four-sided tables, six and eight-sided tables, and in acute octohedrons acuminate at the summit. It has a splendid metallic lustre, a more or less curved lamellar structure, with joints on cleavage in one direction. It yields easily to the knife, and is sectile: the thin laminæ are flexible: it stains slightly when rubbed in the fingers. The specific gravity is 8.919. This ore melts very easily before the blow-pipe; the sulphur and tellurium are volatilized; a blackish round-coloured globule remains, which, on being melted with borax, yields a globule which consists of gold alloyed with silver; the slag which remains tinges borax violet-blue. Its constituent parts, according to Klaproth, are

Tellurium	-	-	-	-	-	32.2
Lead	-	-	-	-	-	54.0
Gold	-	-	-	-	-	9.0
Silver	-	-	-	-	-	0.5
Copper	-	-	-	-	-	1.3
Sulphur	-	-	-	-	-	3.0

This ore is found associated with the preceding ore of tellurium. An ore of tellurium has lately been discovered in Norway by Esmark. An account of the mines where tellurium is obtained, was published by M. Stutz in the new *Memoirs of the Society of Naturalists at Berlin*, vol. ii,

1799, and by Esmark, entitled "An Account of a Mineralogical Journey through Hungary, Transylvania, and the Bannat," in the *Neuen Bergmannischen Journal*, vols. i. and ii. Dr. Clarke, in the 4th vol. of his *Travels*, has also recently given a description of the tellurium mines, from which we shall briefly extract the most interesting particulars at the close of the present article.

*Analysis of the Ores of Tellurium.*—These ores are worked for the gold and silver they contain; and the tellurium with which they are combined being extremely volatile at a low degree of heat, this metal was lost in the process of extraction, and was for a long time supposed to be antimony. Muller first suspected that it was a new metal. Bergmann made several experiments upon it, but left the question undecided.

Klaproth, in 1798, read an account of the discovery of this new metal in the public sitting of the Royal Academy of Sciences at Berlin.

The process of extracting the metal from native tellurium is as follows. Six parts of muriatic acid are poured on the crude ore, which has been previously separated as much as possible from its matrix, and mechanically divided. Heat is applied, and three parts of nitric acid are added by degrees. A violent effervescence takes place. By this process the metallic portion of the ore is dissolved, leaving the matrix, which is principally quartz, behind. In the next place, the filtered solution is carefully diluted with as much water as it will bear without being rendered turbid. Caustic potash or soda is added, until the precipitate which is first produced disappears, and only a dark-brown slimy residue remains.

Decant the solution, setting the residuum apart for subsequent examination: it consists of iron and gold. To the alkaline solution add muriatic acid, until it be saturated, most accurately observing the point of saturation. A copious white precipitate ensues, which in a raised temperature falls to the bottom of the vessel in the form of a heavy powder. It is then collected, and washed with equal parts of water and spirits of wine, and dried in a gentle warmth. This is the oxyd of tellurium. To reduce it to a metallic form, it should be heated in a small glass retort along with one-twelfth of its weight of charcoal, or it may be previously moistened with oil. Adapt a receiver to the retort, and let heat be applied till the powder be brought to a state of ignition. Small metallic drops will be seen lining the upper part of the retort, which fall down separately, and are succeeded by others. On refrigeration, the reduced metal (excepting some few metallic drops on the shoulder of the retort) is found fused, with a clean splendid surface, which is most frequently crystalline. At the moment the reduction takes place, a quantity of carbonic-acid gas is suddenly generated, carrying along with it some particles of the mixture, which it deposits in the receiver. The other ores of tellurium being worked as gold ore; for their analysis, see GOLD.

Tellurium in the pure reguline state was first obtained by Klaproth, who has given the following description of it: it is of a tin-white colour, verging to lead-grey; it has a very high metallic splendour, and a foliated structure; the surfaces of the fragments are very brilliant. When cooling slowly after fusion, it assumes a crystalline surface. It is very brittle, and easily reduced to powder. Among all the known fusible metals, except the metalline alkalies or earths, tellurium possesses the least specific gravity, being only 6.185.

Tellurium melts sooner than antimony, when exposed to the same degree of heat, but later than lead. It inflames upon charcoal before the blow-pipe with a violence resembling detonation, and with a vivid light-blue flame, which on the edges has a greenish tinge. By the continued action of the blow-pipe, it is entirely dissipated in a greyish-white vapour, and emits a smell like that of scraped radish.

Tellurium amalgamates very imperfectly with mercury, even when heat is applied. It combines with sulphur in equal proportions when fused in a gentle heat, and forms a lead-coloured striated substance. With nitric acid, tellurium yields a limpid colourless solution, which is not rendered turbid by water. In the concentrated solution, very light, slender, needle-shaped crystals are formed, which commonly assume a dendritical arrangement. Muriatic acid, on the addition of a little nitric acid, affords a similar clear solution of this metal. This saturated solution is decomposed by the mere addition of water, which throws down a white powder, but this is again dissolved on adding more water.

The powder thrown down is not a pure oxyd of tellurium, as it is combined with a small quantity of muriatic acid. If tellurium be exposed to one hundred times its weight of concentrated sulphuric acid, the acid gradually acquires a tinge of a fine deep amethystine red. This colour is destroyed by the addition of water, and by heat.

Carbonated and pure alkalies precipitate tellurium in the form of a white oxyd, combined with water or an hydrate. This is redissolved by an excess of alkali. Alkaline sulphurets throw down a dark-brown or blackish precipitate. Tincture of galls produces a flocculent yellow precipitate. The solutions of this metal in acids are not decomposed by prussiate of potash, a property which tellurium possesses in common with gold, platina, iridium, osmium, rhodium, and antimony. Zinc and iron precipitate tellurium from its solution in acids, in the metallic state, in the shape of blackish flocculi, which acquire a metallic lustre by trituration. Phosphorus is gradually coated with metallic laminae in a muriatic solution of tellurium.

Oxyd of tellurium on charcoal is reduced with brisk effervescence, and afterwards volatilized; but if heated in a small glass retort it fuses, and on refrigeration exhibits a straw-yellow colour and a striated texture. Some of these properties of pure metallic tellurium are common to native tellurium. Since the first discovery of this metal by Klaproth, it has been further ascertained, that it combines with chlorine in the proportion of 100 parts of tellurium with 90.5 of chlorine. Tellurium forms two distinct compounds with hydrogen, the one of which is solid, and the other gaseous. The first is formed by making tellurium the negative surface in water in the Galvanic circuit; by this a brown powder is produced, which is a solid hydruret of tellurium. The second is formed by acting with dilute sulphuric acid upon the alloy of tellurium and potassium, by which a peculiar gas is produced, having a smell resembling that of sulphuretted hydrogen. It is absorbed by water, and a claret-coloured solution results, which by exposure to the air becomes brown, and deposits tellurium. After being washed with a small quantity of water, this gas does not affect vegetable blue colours. It burns with a blueish flame, depositing oxyd of tellurium, and unites with alkalies. It precipitates most metallic solutions, and is itself instantly decomposed by chlorine gas. It may be called telluretted hydrogen gas.

Tellurium is one of those metals whose oxyds possess the characters of acids, and form distinct classes of salts. The salts formed by a combination of a base with the oxyd of tellurium, are called by Berzelius *tellurets*.

Tellurium, according to Klaproth, combines with oxygen in the proportion of 100 parts of the metal with 20.5 of oxygen; but Berzelius determines the proportions to be 100 tellurium and 27.83 oxygen.

This metal has not hitherto been applied to any useful purpose in the arts, which may probably be attributed to its scarcity, and the comparative recentness of its discovery.

*Tellurium Mines.*—"The mine of Nagyag is distant about

15 miles from Deva, in the bannat of Temeswar: it is situated in the heights of the mountains, lying on the north side of the river Moros. After crossing the river, we began to climb these heights. The roads were not bad, but almost the whole journey to Nagyag was up a steep ascent. We were five hours, although drawn by four horses in a light car, before we reached the small town where the mine has been opened.

"As Transylvania is the only country in the whole world where tellurium has been discovered, our curiosity was greatly excited to view the Nagyag mine. At last the prospect opened upon us with great boldness of scenery quite among the summits of this mountainous region, and in a manner highly picturesque and striking. The situation of the mine was distinguished by an immense heap of discarded minerals thrown out in working it.

"The whole village of Nagyag has been undermined: the works are not only carried on upon a grand and extensive scale, but they are conducted with a degree of neatness, for which the Germans have long been famous in mining. Some specimens of tellurium are so exceedingly rich in gold, that in the sale of them for the crown, it is necessary to weigh them, and to estimate the price according to the quantity of gold they contain. This kind of ore is always kept locked up in private warehouses. The common ore lies exposed in heaps, at which the workmen are busily employed in preparing the ore for stamping.

"When the mine was first discovered, the mountains around it were covered with forests, which have since been cut down to supply the mines with timber. The discovery of the mine is thus related on the respectable authority of baron Boon, in his letter to professor Feber. "A Wallachian, whose name was Armenian John, came to my father, then possessed of a rich silver mine at Cuertes, telling him, that as he constantly observed flames issuing from and playing upon a fissure in the Nagyag forest, he was of opinion that rich ore might be hid under ground. My father was fortunate enough to listen to the poor man's tale; and accordingly he drove a gallery in the ground which the Wallachian had pointed out. The works went on some years without success, and my father had resolved to give them up. However, he made a last drift towards the fissure, and there he discovered the black and lamellated gold ores, which were at first looked upon as iron glimmer, but proved, when assayed, to be, what they really are, rich gold ores." *Travels through the Bannat, Lond. 1799.*

"Other veins were afterwards discovered running parallel to each other from north to south, and dipping from west to east. When Boon visited Nagyag, the mine had only been worked to the depth of 60 fathoms. Its depth is now 150 fathoms. The mountains are entirely composed of porphyry, covered with red clay or red slate and sandstone. The veins break off as soon as they reach the red slate. These veins contain with the ore, felspar and fat quartz. There is also found here a very rich kind of ore, which is finely woven into the texture of a reddish felspar. Among the rich ores, native silver occurs mixed with gold. Another variety is called by the miners *cotton ore*; it consists of little native silvery gold grains in tellurium, adhering to an argillaceous matrix. All the semi-metals at Nagyag are found, when carefully analysed, to contain gold. According to Boon, the tellurium mines in the course of 20 years yielded above 4,000,000 florins in gold and silver. At the time of our arrival it had been worked 60 years, and was equally productive."

TELLUS, TERRA,  $\ominus$ , in *Astronomy*. See EARTH.

TELMARA, in *Ancient Geography*, a town of Asia Minor, in Caria.

TELMEEN,

TELMEEN, in *Geography*, a town of Africa, in the country of Sahara, anciently called *Almæna*; 50 miles W. of Gabs.

TELMES, a town of Morocco; 15 miles from Safi.

TELMISSUS, in *Ancient Geography*, a name given to three towns in Asia Minor, one at the distance of 60 stadia from Halicarnassus, in Lycia; situated at the S.E. part of the gulf of Glaucus,  $2\frac{1}{2}$  leagues N.E. of the promontory Telmessus, and nearly S.W. of the mouth of the river Glaucus. Its inhabitants were famous for their skill in augury: this town had a very fine theatre:—the second was in Caria, and the third in Pisidia.—Also, a mountain of Asia Minor, in Lycia.

TELO MARTIUS, a port of Gallia Narbonensis. See TOULON.

TELOBIS, a town of Spain, in the Tarragonese, belonging to the Jaccetani. Ptol.

TELOBO, in *Geography*, a small island in the East Indian sea, near the west coast of Gilolo. S. lat.  $1^{\circ} 6'$ . E. long.  $127^{\circ} 15'$ .

TELON, a name given by the chemists to fire.

TELONÆ, *τελωνιαί*, among the Athenians, farmers of the public revenues; for the severity with which they were handled, in case they failed, see Potter, *Archæol. Græc. lib. i. c. 14. tom. i. p. 81.*

TELONIUM. See THELONIUM.

TELONIUS, SALTO, in *Ancient Geography*, a river of Italy, in the country of the Sabines. It sprang towards the S. of Carseoli, and ran N. to discharge itself into the Velinus.

TELOPEA, in *Botany*, from *πυλωπος*, conspicuous at a distance, a name very suitable to this magnificent shrub, with its fine scarlet flowers.—Brown Tr. of Linn. Soc. v. 10. 197. Prodr. Nov. Holl. v. 1. 388. Ait. Hort. Kew. v. 1. 212.—Our *Embothrium speciosissimum*, with *E. truncatum* of Labill. Nov. Holl. v. 1. 32. t. 44, constitute this genus. See EMBOTRIUM, from which we are unwilling to separate them, for the reasons given under OREOCALLIS. The extremely close natural affinity, and great resemblance, of these plants to each other, makes us mistrust even the technical character of the lateral stigma (omitted indeed in Hort. Kew.), supposing that organ to be really terminal in *Embothrium*, which on a careful inspection we find reason to doubt. The efficient part of the stigma in *E. coccineum* is certainly oblique. We wish to learn, rather than dictate, but we cannot confide implicitly in the most able guide.

TELOS, PISCOPIA, in *Ancient Geography*, an island of the Archipelago, situated S.E. of the isle of Cos, and N.W. of that of Rhodes. Pliny says that it was celebrated for its perfumes.

TELPAH, in *Geography*, a town of Hindoostan, in Bahar; 40 miles S.S.W. of Patna.

TELPHUSSA, in *Ancient Geography*, a town of the Peloponnesus, in Arcadia, upon an eminence, at some distance from the river Ladon, S.E. of Trophæa. A temple of Ceres was situated near this town, in which she was honoured under the name of Lusia.

TELUMNUM, a town of Aquitanic Gaul, on the route from Aquæ Tarbellicæ to Burdigala, between Cæquosa and Salamacum. Anton. Itin. This is the same with Tellonum.

TELWARAH, in *Geography*, a town of Hindoostan, in Agimere; 25 miles N. of Buddakano.

TEMA, a town of Africa, in the kingdom of Ningo, on the Gold Coast.

TEMACHIS, in *Natural History*, the name of a genus of fossils, of the class of the gypsums; the characters of which are these: it is of a softer substance than many of the other genera, and of a very bright and glittering hue. The name is derived from the Greek *τεμαχος*, *frustulum*, a small irregular fragment; the bodies of this genus being

composed of an assemblage of multitudes of irregular flaky fragments, as are all the gypsums; but no genus of them so visibly as these. Hill. See GYPSUM.

TEMALA, NEGRAIS, in *Ancient Geography*, a maritime town of India, on the western coast beyond the Ganges, S. of Berabonna, where the coast turns towards the E. at the W. mouth of the river Sabaracus.—Also, a river of India, the mouth of which was near Berabonna, and the promontory of Temala.

TEMAN, in *Commerce*, the name of a dry measure at Mocha, in Arabia, containing 40 mecmedas or kellas, and weighing in rice 168 lbs. avoirdupois.

TEMANIK, in *Geography*, a town of Persia, in the province of Kerman; 25 miles S. of Mastih.

TEMAPARA, in *Zoology*, the name of a peculiar species of lizard, called also *tejuaguacu*.

It approaches much to the nature of the iguana, but is black, spotted with white.

TEMBA, in *Geography*, a province of the kingdom of Angola.

TEMBARE, a town on the west coast of the island of Celebes. S. lat.  $1^{\circ} 27'$ . E. long.  $119^{\circ} 20'$ .

TEMBASA, in *Ancient Geography*, a celebrated town of Greece, in the Peloponnesus. Pliny.

TEMBEN, in *Geography*, a town of Abyssinia; 100 miles E.S.E. of Siré.

TEMBLEQUE, a town of Spain, in New Castile; 13 miles E.S.E. of Toledo.

TEMBRIUM, or TYMBRIUM, in *Ancient Geography*, a town of Asia, in Phrygia.

TEMBROGIUS, a river of Asia, in Phrygia, which ran into the Sangarius.

TEMBRUS, a town of the island of Cyprus.

TEMBUL, in *Botany*, a name used by some authors for the plant called hetel.

TEMDE, in *Geography*, a river of England, which runs into the Severn, 2 miles above Ludlow.

TEMDEGUE KIAMEN, a post of Chinese Tartary; 10 miles S.E. of Tciticar.

TEME, or TEAM, a river of England, which rises in the county of Radnor, and runs into the Severn, 2 miles below Worcester.

TEMEH, a town of Egypt, on the left bank of the Nile; 9 miles N. of Tahta.

TEMEH *Iffebag*, a town of Egypt; 12 miles N. of Fayoum.

TEMELET, a town of Morocco; 70 miles W.S.W. of Morocco.

TEMELO, in *Ichthyology*, a name used by some for the fish called in English the *grayling*, and in some places the *umber*.

TEMEN, in *Geography*, a town of Arabia, in the province of Nedsjed; 80 miles S.S.E. of Jamama.

TEMENDEFUST, or METAFUST, a town of Algiers; 10 miles E. of Algiers.

TEMENEH, a town of Asiatic Turkey, in Natolia; 52 miles W.N.W. of Sinob.

TEMENI, a town of the island of Candia; 6 miles S. of Candy.

TEMENI *Porta*, in *Ancient Geography*, a small town of Asia Minor, in Lydia.

TEMENIA, a town of Asia, in Phrygia, on the confines of Lycaonia.

TEMENIUM, a fortress of the Peloponnesus, on the confines of the Argolide. Here were two temples, one dedicated to Neptune, and another to Venus.

TEMERICUS AGER, a small country of Gallia Narbonensis, towards the source of the Rhine.

TEMES, in *Geography*, a river of Hungary, which rises

in the fourth-east part of the mountains, and runs into the Danube, opposite Belgrade.

TEMESA, in *Ancient Geography*, a town of Italy, in Brutium, called Tempfa or Temfa in the time of Strabo.

TEMESCAMANG, in *Geography*, the principal of those lakes in Lower Canada formed by the Utawas and its contributory streams, which lake has always been a trading port, and which may be said to continue, by a succession of rivers and lakes, upwards of 50 leagues from the Forks, passing near the waters of the lake Abbitiby, in N. lat.  $48^{\circ} 30'$ , which is received by the Moose river, that discharges itself into James bay. Mackenzie's Travels.

TEMESCHU, a town of New Mexico, in the province of Mayo; 160 miles E.N.E. of Santa Cruz.

TEMESVAR, or TEMESWAR, a town of Hungary. This is an important fortress, situated on the river Beg, which forms a morass round it, and is strongly fortified. It is the capital of a bannat, the residence of a governor, and the see of a Greek bishop. It was taken by prince Eugene in 1716; and by the peace of Passarowitz was, with the whole bannat, confirmed to the house of Austria; since which time it has been almost wholly rebuilt. It is large and populous; the streets broad and well paved. The fortress is a castle with walls nine feet thick, and requires a garrison of 14,000 men. It contains about 443 square German miles, with a population of about 450,000 inhabitants; 52 miles E.N.E. of Belgrade. N. lat.  $45^{\circ} 49'$ . E. long.  $21^{\circ}$ .

TEMIN, in *Commerce*, a money of account in Algiers, equivalent to 2 carubes, or 29 aspers. See COIN.

TEMISCHBERG, in *Geography*, a fortress of Russia, in the government of Caucasus; 60 miles W. of Stavropol.

TEMISSAH, or TEMMISSA, a large town of Africa, in the province of Fezzan, distant from Mourzouk, its capital, in an E.N.E. direction, about 120 miles. Here the caravan of pilgrims from Bornou and Nigritia, which takes its departure from Mourzouk about the end of October, or beginning of November, and travels by the way of Cairo to Mecca, arrives in the evening of the seventh day, and usually provides the stores of corn and dates, and dried meat, that are requisite for its dreary passage.

TEMISVAR. See BABA.

TEMITZ, a town of Bohemia, in the circle of Chrudim; 18 miles N.W. of Chrudim.

TEMLOWKA, a town of Algiers, anciently called "Sigus;" 24 miles S.E. of Conflantina.

TEMMA, a town of Africa, on the Gold Coast. N. lat.  $5^{\circ} 45'$ . W. long.  $0^{\circ} 55'$ .

TEMMELISSUS, in *Ancient Geography*, a town of Asia, in Syria, on the route from Celecoma to Lariffa, between Chalcida and Apamea. Anton. Itin.

TEMME, in *Geography*, a town of Sweden, in the government of Ulea; 20 miles S. of Ulea.

TEMNIKOV, a town of Russia, in the government of Tambov; 116 miles N.N.E. of Tambov. N. lat.  $54^{\circ} 28'$ . E. long.  $43^{\circ} 14'$ .

TEMNOS, in *Ancient Geography*, a town of Asia Minor, in Ionia, at the mouth and north of the river Hermus. It did not subsist in the time of Pliny.

TEMOEL, in *Geography*, a town on the west coast of the island of Celebes. S. lat.  $0^{\circ} 5'$ . E. long.  $119^{\circ} 35'$ .

TEMORIS, a town of New Mexico, in the province of Culiacan; 70 miles N.N.E. of Culiacan.

TEMOSOSHI, a town of New Mexico, in the province of Hiaqui; 130 miles E. of Riochico.

TEMPATLAHOAC, in *Ornithology*, the name of a broad-billed bird of the West Indies, described by Nicrem-

berg; and by him esteemed a species of duck. It is a variety of the *anas clypeata*. See DUCK.

It is of the size of the common duck; is common on the lakes of Mexico, and is a good eatable bird. Ray.

TEMPE', in *Ancient Geography*, a celebrated valley of Theffaly, between the mountains Ossa and Olympus. Ælian, Pliny, and Strabo represent it as 40 stadia in length, along the middle of which lay the course of the river Peneus, which separated Theffaly from Macedonia. Tempé, according to Livy, was the name given to the wood or forest, which, though not dangerous, was difficult for an army to pass, because of two defiles five miles in length; and the river Peneus made a terrifying noise in passing through this deep valley. Tempé, it is said, is derived from the Greek *τεμπε*; in the plural, signifying wood. Tempé, at its entrance, has a large village, which has been long famous for the accomplishments of its inhabitants, and for the great trade they carry on with Vienna and the interior of Europe.

TEMPE', in *Commerce*. See STAMPE.

TEMPELBERG, in *Geography*, a town of Hinder Pomerania; 19 miles W. of New Stettin. N. lat.  $53^{\circ} 29'$ . E. long.  $16^{\circ} 12'$ .

TEMPER, in a *Physical Sense*. See MAN.

TEMPER of a Horse, the disposition of the animal, which should be carefully attended to while he is young, as well as in the purchase.

TEMPER, in a *Musical Sense*. See TEMPERAMENT, in *Music*.

TEMPER, in a *Mechanical Sense*. See TEMPERING.

TEMPERAMENT, TEMPERAMENTUM, *Temperature*, in *Physiology*. See MAN.

TEMPERAMENT, *Temperamento*, in *Music*, generally denotes a rectifying or amending of the false or imperfect concords, by transferring to them part of the beauty of the perfect ones.

The degrees of the octave, which may be called its *elements*, as being the smallest intervals into which it is resolvable, are two greater semitones, two less tones, and three greater tones.

Now the different situation of these elements, with respect to each other, occasions that intervals or concords of the same name, as thirds, fourths, &c. do not consist of the same degrees or elements, though there be always the same number of them: but one fourth, for instance, is agreeable and perfect, and another not.

To mend these imperfect concords, the musicians have bethought themselves to *temper*, *i. e.* give them part of the agreeableness of perfect ones. In order to this, they take a medium between the two, and this they call a *temperament*; which necessarily produces a new division of the octave, or, which amounts to the same, new elements.

For instance, whereas naturally its elements are the greater semitone, and the greater and less tone; they take a middle tone formed of the greater and the less: and the only elements now are the greater semitone, and this mean tone, which renders the five intervals that are tones equal, and those that are semitones less unequal to these.

One might also divide each of the five tones of the octave into semitones, which, joined to the two it naturally has, would make twelve: in which case, the whole octave would be divided into twelve equal parts, which would be mean semitones.

It is easy to form various other kinds of temperaments: all the difficulty is to find such as are free from two great inconveniences, *i. e.* which do not alter either all the concords too much, or, at least, some of them.

All such divisions of the octave are called *tempered* or *temperative system*.

The temperament does, indeed, according to the definition above given, and considered in one view, correct some false concords,

## TEMPERAMENT.

conords, yet, in other respects, it spoils and falsifies both perfect and imperfect conords, and renders discords more harsh than they would otherwise be, if the intervals were justly taken. To explain this, we must consider that all the intervals are founded on the primary proportions arising from the numbers 2, 3, and 5, that is, if we do not exceed the compass of an octave,  $\frac{2}{3}$ ,  $\frac{3}{4}$ , and  $\frac{4}{5}$ . See INTERVAL.

The nearer we come in practice to the true intervals, the more perfect the melody and harmony will be; and it is certain, that the human voice, and some instruments, as violins, &c. which have no stops nor frets, will execute music to a great degree of exactness; but the case is not the same with fixed or fretted instruments, as harpsichords, organs; lutes, viols, &c. Accuracy is here impossible, unless we would content ourselves with always playing in the same key, without any transition or transposition whatsoever. In this case, indeed, the harpsichord or organ might vie with the accuracy of the voice or violin. For instance: if we were to compose or play in the key of C, then we might make the several intervals of that key to be in the following true proportions,  $1, \frac{2}{3}, \frac{4}{5}, \frac{3}{2}, \frac{1}{4}, \frac{1}{3}, \frac{2}{5}, \frac{1}{2}$ , that is, in whole numbers,  $\left\{ \begin{array}{cccccccc} C & D & E & F & G & A & B & C \\ 24 & 27 & 30 & 32 & 36 & 40 & 45 & 48 \end{array} \right\}$  and the instrument tuned in this manner, would perform any piece of music in C, justly composed, with great beauty and exactness; taking for granted, that every key, fundamental note, or sound, ought to have its true fifth and fourth, and that these ought also to have their true fifths and thirds.

Now this being premised, it will presently appear, that in making any transposition or transition from C, we shall find some false concord. Thus, for instance, if we proceed to G, and consider it as a key, or fundamental sound, we shall have the following series of numbers for the octave of G, *viz.*  $\left\{ \begin{array}{cccccccc} G & A & B & C & D & E & F & g \\ 36 & 40 & 45 & 48 & 54 & 60 & 64 & 72 \end{array} \right\}$

But here the interval between 40 and 54 is false, being a comma too much, for the second of a key must make a true fifth with the fifth of the same key. In like manner, if we were to proceed from C to A, as a new key, we should find the following series for the octave of A,  $\left\{ \begin{array}{cccccccc} A & B & C & D & E & F & G & a \\ 40 & 45 & 48 & 54 & 60 & 64 & 72 & 80 \end{array} \right\}$  where the interval between A 40 and its fourth D 54 is false, being too great by a comma. If any other transition were examined, we shall always find some note false; as in F, the sixth would be redundant by a comma; and in D, the fifth would be deficient by a comma. All which shews the impossibility of truth and exactness of music on fixed instruments. Yet as these instruments have their use and convenience in some respects, it was proper to endeavour to find out a method of making them tolerable. It has been observed under the article INTERVAL, that the tone major exceeds the tone minor by a comma. Their difference is necessary for the truth and perfection of music; but yet if these tones were rendered equal, the ear would not be offended. And this has suggested the means of tempering fixed instruments. If we were to make all tones equal to the tone major, as some imagine the ancients did, then we should find the ditonus, or third, exceeding a true third major by one comma, which would be intolerable. In like manner, if all tones were to be minor, we should have thirds major defective by a comma, which would also be intolerable, not to mention other false intervals that must necessarily arise from such a supposition.

Supposing then one tone increased, and the others diminished by half a comma, we should have our thirds major remain perfect. But still it would be necessary to examine what fifths this supposition would give. Now it is evident that a tone major added to an octave, makes just two fifths,

thus  $\frac{2}{3} \times \frac{2}{3} = \frac{4}{9} = \frac{2}{3} \times \frac{2}{3}$ . But the tone here added is a tone major, and the tone we have assumed is a temperate tone deficient from the tone major by half a comma; hence the sum of the two fifths, on this supposition, will fall short of the truth by half a comma, and consequently one fifth will be deficient a quarter of a comma. Which difference, although it be sensible, yet experience shews, that fifths so diminished are tolerable.

This temperament is what is called the common or vulgar temperament, and consists, as has been said, in diminishing the fifth by a quarter of a comma, in preserving the third major perfect, and dividing it into two equal tones. Which being supposed, it follows that the fourth must exceed the truth by a quarter of a comma; that the third minor will be deficient by the same quantity; that the sixth minor will be perfect, and the sixth major redundant by a quarter of a comma; and lastly, that the semitone major will exceed the truth by a quarter of a comma. If we introduce chromatic notes, or flats and sharps, the semitone minor will also exceed the truth by a quarter of a comma, and consequently the difference between the two semitones, or the diesis enharmonica, will be preserved.

If then we had a harpsichord or organ, with each feint or half note divided, we should have the following notes or sounds, *viz.* C\*, D♭, D, D\*, E♭, E, F\*\*, G♭, G, G\*, A♭, A, A\*, B♭, B, c, in the compass of an octave. Yet this system of notes, numerous as they seem, would not be sufficient for all transitions and transpositions. For though a piece of music transposed to any of the natural keys C, D, E, F, G, A, B, and to the flats, as E♭ and B♭, and some others, would do well; yet, in transposing to sharps, as to C\*, we should not find a true third major, unless we introduced E\*. And even in flats, as A♭ and E♭, we should not find a true third major in descending, or a sixth minor in ascending, unless we introduced F♭ and C♭. And in like manner, transpositions to G\* and E♭ would oblige us to introduce B\* and C♭. Nor would even this suffice, for if necessity required a transposition from the key of C to that of D\*, we should not find a true third major without introducing F\*\* and c. So that at last we shall come to a temperate system, where, in ascending, the notes C, D, F, G, A, would each have its sharp and double sharp, and the notes B and E each a single sharp. In descending, the notes E, D, B, A, G, would each have their flat and double flat, and the notes F and C each a single flat. And thus the octave would be divided into 31 intervals, whose designations are C D♭♭ C\* D♭ C\*\* D E♭♭ D\* E♭ D\*\*

<sup>1</sup> E F♭ <sup>2</sup> E\* <sup>3</sup> F <sup>4</sup> G♭♭ <sup>5</sup> F\* <sup>6</sup> G♭ <sup>7</sup> F\*\* <sup>8</sup> G <sup>9</sup> A♭♭ <sup>10</sup> G\* <sup>11</sup> A♭♭ <sup>12</sup> G\*\* <sup>13</sup> A <sup>14</sup> B♭♭ <sup>15</sup> A\* <sup>16</sup> B♭ <sup>17</sup> A\*\* <sup>18</sup> B <sup>19</sup> A\*\*\* <sup>20</sup> B <sup>21</sup> C <sup>22</sup> B\* <sup>23</sup> C. Where the letters C, D, E,

<sup>24</sup> F, G, A, B, signify the common diatonic notes: those marked with a single \* or ♭ are the chromatic; and those marked with a double \*\* or ♭♭ are enharmonic notes; so called, because the interval between them and the next diatonic note is an enharmonic diesis; for which reason, the notes E\*, F♭, and B\*, C♭, are also enharmonic. But even in this division of the octave, all the notes would not have a third major in ascending and descending: thus, for instance, D\*\*\* has no third major; for this would be F\*\*\*, which is not in the scale, nor can any number of additional notes suffice in all cases. But this inconvenience is easily remedied, and the system considerably improved, by making all the thirty-one intervals equal. We have already observed, that in

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the common temperament, the semitones major and minor exceed the truth by a quarter of a comma, and that the enharmonic diesis is preserved true. Hence it follows, that the hyperoche, or difference between the chromatic and enharmonic diesis; for example, the interval between F♭ and E♯, or D♭♭ and C♯, &c. will also exceed the truth by a quarter of a comma. Now the hyperoche, by our table under INTERVAL, is equal to 1.37695, to which adding a quarter of a comma = 0.25000, we have 1.62695, which differs from the enharmonic diesis 1.90917 only by 0.28222, or about  $\frac{1}{7}$  of a comma. Neglecting this small difference, let us suppose all the thirty-one intervals of the octave equal, it will follow that transpositions to all the notes of the system, whether diatonic, chromatic, or enharmonic, will be equally good, and differ only in pitch or tone, as they ought, but not in accuracy, which must next be examined.

The division of the octave into thirty-one parts may be conveniently done by logarithms. Under the article INTERVAL, I find the logarithm of the octave = 55.79763 commas; consequently each diesis, or division of the octave, = 1.79992 comma; hence the fifth, being 18 diesis, will be 32.399 commas. Now the true fifths being 32.640, the fifth consequently in this temperament is deficient by 0.241 parts of a comma, which is less than a quarter of a comma by  $\frac{1}{10}$  part; and therefore this fifth will, strictly speaking, be better than that of the vulgar temperament by  $\frac{1}{10}$  of the comma; but this is insensible. Next, proceeding to examine the third, we shall find it equal to 10 diesis or divisions, that is, 17.999 commas; and the true third major being 17.963 commas, the difference is 0.036, that is, about  $\frac{1}{28}$  of a comma. Now as the ear can bear a fifth, altered by a quarter of a comma, it will much more easily bear the alteration of  $\frac{1}{28}$  of a comma in a third major. Again, in this temperament the third minor is indeed, strictly speaking, worse than in the vulgar, which differs from the truth but a quarter of a comma, whereas here it differs by about  $\frac{1}{7}$  of a comma more; but then this difference is insensible.

Thus we have been led from the consideration of the vulgar temperament, to the invention of the temperament which divides the octave into 31 equal intervals, commonly called Huygens's temperament. This great mathematician was, indeed, the first who gave a distinct account of it, and shewed its use and accuracy. But here, as in many other inventions, we find the hint of the thing much older than the true knowledge of it. See Huygenii Opera omnia, vol. i. p. 748, 749, edit. 1. Lugd. Batav. 1724.

The division of the octave into 31 parts was invented in Italy about 300 years ago, by Don Nicola Vincentino. The title of his book is "L'Antica Musica Riddotta alla Moderna Prattica, &c." Roma, 1555. fol.; and an instrument, called *archicembalo*, was made upon this scheme, as Salinas informs us, who at the same time condemns it, as very disagreeable in practice. But this could be owing to nothing but its not being tuned according to the intention of the inventor. For if all the thirds major of this instrument were made perfect, and the fifths diminished by a quarter of a comma, it is evident that the instrument would be equally exact with any tuned according to the vulgar temperament, and would suffice for transpositions to any diatonic or chromatic notes, though not to all the enharmonic, as D♯♯, &c. because we should not find its third major. And if the instrument were tuned according to M. Huygens's scheme, of making all the divisions equal, it would then have all the 31 keys equally good, and very near the truth. See Salinas, lib. iii. The title of his work is "Francisci Salinæ Burgensis de Musica Libri Septem," Salinaticæ, 1577, fol. Merfennus's work is intitled: "Harmonicorum, Libri XII. auctore F. M. Merfeno Minimo, Lutetiæ Parisiorum," 1648, fol. He published another book before this, the title

of which is "Harmonic Universelle, contenant la Theorie et la Pratique de la Musique," Paris, 1636, fol. 2 vols.

Hence it is plain, Salinas and Merfennus had not sufficiently examined this matter.

The use of this temperament of M. Huygens deserves to be introduced into the practice of music, as it will facilitate the execution of all the genera of music, whether diatonic, chromatic, or enharmonic; nor does the multiplicity of its parts render it impracticable, the author assuring us that he had a harpsichord made at Paris with such divisions, which was approved of and imitated by some able musicians. Merfennus also gives a scheme for this purpose; and Salinas says he saw and played upon such an instrument. See also Don Vincentino before cited, lib. v. p. 99, &c.

M. Huygens, to facilitate the tuning of instruments with such divisions, has given us a table of the parts of an octave, according to his system, together with their logarithms. The table is as follows:

The division of the octave into 31 equal parts.					The division of the octave according to the common temperament.
I.	II.	III.	IV.	V.	VI.
N. 97106450	50000	Ut <sup>2</sup>	C <sup>2</sup>	50000	4.6989700043
4.6989700043	51131				
4.7086806493	52278				
4.7183912943	53469	Si	B <sup>x</sup>	53499	4.7283474859
4.7281019393	54678				
4.7378125843	55914	Sa	B	55902	4.7474250108
4.7475232293	57179	*	*	57243	4.7577249674
4.7572338743	58471				
4.7669445193	59794	La	A	59814	4.7768024924
4.7766551643	61146				
4.7863658093	62528	*	*	62500	4.7958800173
4.7960764543	63942	Sol <sup>x</sup>	G <sup>x</sup>	64000	4.8061799740
4.8057870993	65388				
4.8154677443	66866	Sol	G	66874	4.8252574989
4.8252083893	68378				
4.8349190343	69924				
4.8446296793	71506	Fa <sup>x</sup>	F <sup>x</sup>	71554	4.8546349804
4.8543403243	73122				
4.8640509693	74776	Fa	F	74767	4.8737125054
4.8737616143	76467				
4.8834722593	78197				
4.8931829043	79964	Mi	E	80000	4.9030899870
4.9028935493	81772				
4.9126041943	83621	Ma	E♭	83592	4.9221675119
4.9223148393	85512	*	*	85599	4.9324674655
4.9320254843	87445				
4.9417361293	89422	Re	D	89443	4.9515949935
4.9514467743	91444				
4.9611574193	93512	*	*	93459	4.9706225184
4.9708680643	95627	Ut <sup>x</sup>	C <sup>x</sup>	95702	4.9809224750
4.9805787093	97789				
4.9902893543	100000	Ut	C	100000	5.0000000000
4.9999999993					

The second column of this table contains the numbers expressing the length of chords making 31 equal divisions, the longest, answering to C, being supposed to be divided into 100,000 parts.

In the third column are the syllables by which the notes are usually named in France; and the asteric \* shews some enharmonic notes, of which that near *sol* is most necessary.

In the fourth column are the letters commonly used to denote the found of the octave.

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The numbers of the second column were found by means of those in the first, which are their respective logarithms; and these were found by dividing 0.30102999566, the logarithm of 2, by 31. The quotient 97106450 is marked N, and being continually added to the logarithm of 50000, that is, to 4.6989700043, gives all the logarithms of the first column to the greatest 4.9999999993, which being extremely near to 5.000000000, the logarithm of 100000, shews the operation to have been rightly performed.

The fifth column shews the lengths of the chords in the common temperament; and the sixth column contains their respective logarithms. Vide Huygenii Opera, vol. i. p. 752, 753.

The learned author of this temperament has not given the notes answering to all the divisions of the octave; but that may easily be supplied from what has been said above when we derived this temperament from the consideration of the common.

As Huygens has not given the names of all the intervals that occur in his temperate scale, we shall here insert them in the octave, from C to c, with their respective measures in the commas, and tenths of a comma

Intervals.	Names.	Measures.
From C to	D <sup>bb</sup> 1. Diminished second, extreme flat second, or enharmonic diesis.	1.8
	C <sup>*</sup> 2. Semitone minor, or chromatic diesis.	3.6
	D <sup>b</sup> 3. Flat second, or semitone major.	5.4
	C <sup>**</sup> 4. Double semitone minor.	7.2
	D 5. Second, or tone.	9.0
	E <sup>bb</sup> 6. Diminished third, or extreme flat third.	10.8
	D <sup>*</sup> 7. Superfluous second.	12.6
	E <sup>b</sup> 8. Third minor, or flat third.	14.4
	D <sup>**</sup> 9. Extreme superfluous second.	16.2
	E 10. Third major, or sharp third.	18.0
	F <sup>b</sup> 11. Diminished fourth.	19.8
	E <sup>*</sup> 12. Superfluous third.	21.6
	F 13. Fourth.	23.4
	G <sup>bb</sup> 14. Extreme diminished fifth.	25.2
	F <sup>*</sup> 15. False fourth, or tritonus.	27.0
	G <sup>b</sup> 16. False fifth, or semidiapente.	28.8
	F <sup>**</sup> 17. Extreme superfluous fourth.	30.6
	G 18. Fifth.	32.4
	A <sup>bb</sup> 19. Diminished sixth, or extreme flat sixth.	34.2
	G <sup>*</sup> 20. Superfluous fifth.	36.0
	A <sup>b</sup> 21. Flat sixth, or sixth minor.	37.8
	G <sup>**</sup> 22. Extreme superfluous fifth.	39.6
	A 23. Sharp sixth, or sixth major.	41.4
	B <sup>bb</sup> 24. Diminished seventh, or extreme flat seventh.	43.2
	A <sup>*</sup> 25. Superfluous sixth.	45.0
	B <sup>b</sup> 26. Flat seventh, or seventh minor.	46.8
	A <sup>**</sup> 27. Extreme superfluous sixth.	48.6
	B 28. Sharp seventh, or seventh major.	50.4
	c <sup>b</sup> 29. Diminished octave.	52.2
	B <sup>*</sup> 30. Superfluous seventh.	54.0
	c 31. Octave.	55.8

The temperate diesis enharmonica of Huygens being 1.8 comma, nearly, which is easily remembered, the measure of any interval in the octave may be found by multiplying it by the number denoting the place of that interval. Thus the sixth minor, being the twenty-first interval, will be =  $1.8 \times 21 = 37.8$ . The octave, being the thirty-first, will be =  $31 \times 1.8 = 55.8$ , which does not differ from the truth by more than 0.00237, that is, not by  $\frac{1}{425}$  of a comma, and therefore perfectly insensible. See INTERVAL.

All the intervals in the foregoing table, either have received names, or at least might receive them, from a perfect analogy to the names in use among practical musicians; but many of these intervals are as yet unheard of among practitioners. Perhaps, if all the genera of ancient music were restored, every interval here mentioned might be of use, either in melody or harmony, and thereby greatly add to the variety of composition.

We have already mentioned the advantages of M. Huygens's system; but its excellency will better appear by comparing it with the schemes of others. We may distinguish and name the different temperaments by the number of equal parts into which the octave is supposed to be divided. The temperaments that occur in books are temperaments of 12, 19, 31, 43, 50, 53, and 55 parts, of which in order.

The temperament of 12 parts is founded on the supposition that the semitones major and minor may be made equal. Hence the octave will be divided into 12 equal semitones, seven of which will make the 5th, four the 3d, and three the 3d minor.

The temperament of 19 parts goes upon the supposition that the semitone major is the double of the semitone minor, Hence the tone will be 3, and the third major 6. The diesis enharmonica will be 1, and consequently the octave, being three thirds major and a diesis, will be 19. The fifth contains 11 parts. The harpsichord, in this scheme, will have every feint cut in two, one for the sharp of the lower note, and the other for the flat of the higher. Between B and C, and between E and F, will be interposed keys, which must serve for the sharps of B and E, and the flats of C and F respectively.

The temperament of 31 parts is M. Huygens's, already described: here the semitones are as 3 to 2. The third major is 10, and the fifth 18.

The temperament of 43 is M. Sauveur's, and by him very fully described in the Memoirs of the Royal Academy of Sciences, A.D. 1701, 1702. He supposes the proportion of the semitones to be as 4 to 3. Hence his tone is 7, the third major 14, the fifth 25, and the octave 43. What musical foundation this learned gentleman went upon in the investigation of this temperament, is not known: but it seems liable to insuperable difficulties; for here the diesis enharmonica is but the half of the difference between it and the chromatic diesis: whereas, in truth, this difference, instead of being double of, is really less than the enharmonic diesis, as was long ago objected to him by Mr. Hensling, and appears from the table under INTERVAL. Miscel. Berolin. tom. i. p. 285, 286.

Besides, his enharmonic diesis falls greatly short of the truth; being but 1.27 of a comma, which is an error of 0.64, or nearly  $\frac{1}{4}$  of a comma. Whereas, in M. Huygens's temperament, the error of the diesis is almost insensible, being but  $\frac{1}{425}$  of a comma. Nor are the practical advantages of M. Sauveur's system any ways comparable to Huygens's. His fifth is indeed, strictly speaking, better; but so little, that the difference is not sensible, not being  $\frac{1}{71}$  of a comma. On the other hand, his thirds are sensibly worse, the major being

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being  $\frac{2}{3}$ , and the minor  $\frac{1}{3}$  of a comma false. Whereas Huygens's third major does not differ sensibly from the truth, and the minor has no sensible difference from the third minor deficient by  $\frac{1}{3}$  of a comma of the common temperament, which ought to be deemed the limit of the diminution of concords. If we add to this, that the much greater number of parts in M. Sauveur's octave, makes it much more intricate than M. Huygens's, and that these parts would be false or useless, even supposing the enharmonic genus restored, no musician will long hesitate which he ought to prefer.

The temperament of 50 parts is proposed by Mr. Henfling in the Miscellan. Berolin. above cited: he takes the proportion of the semitone as 5 to 3: hence his tone is 8, the third major 16, the fifth 29, and the octave 50. The third major and fifth in this system will be worse than Huygens's, though the third minor be a little better. The third major is here less than the true, and the fifth deficient by more than  $\frac{1}{3}$  of a comma, which is a fault, not to mention the inconveniency arising from dividing the octave into 50 parts; besides, 5 : 3, the proportion of the semitones here assumed, although expressed in greater numbers, is not so near the truth as M. Huygens's of 3 : 2. See RATIO.

The temperament of 53 parts is mentioned by Mersennus.

Here the tones will be unequal, 9 being the tone major, and 8 the minor. Hence the third major will be 17, and the fifth 31, which last does not differ from the truth by above  $\frac{1}{33}$  part of a comma. The third minor is also more perfect than in M. Huygens's system. But the multiplicity of parts in the octave of this system renders it too intricate; and the distinction of tones major and minor upon fixed instruments is impracticable.

The last temperament we have to mention is that of 55 parts, which M. Sauveur calls the temperament of practical musicians. Its foundation lies in assuming the proportion of the semitones as 5 to 4; so that the tone will be 9, the third 18, and the fifth 32. The fifth in this system, as in that which makes the semitones equal, is nearer the truth than M. Huygens's, but this advantage is not  $\frac{1}{15}$  of a comma; and on the other hand, the thirds, both major and minor, are here greatly mistuned, as will appear by the annexed table, exhibiting the thirds and fifths of these several temperaments, as also the thirds and fifths of the common temperament, and two mentioned by Salinas, marked 1st Salin. 2d Salin. The letter V. stands for the fifth; III. for the third major; and 3. for the third minor. The fifths are all deficient, but the thirds are sometimes less than the true; the first are marked +, the others -.

Temperaments.	V. Com.	Error.	III. Com.	Error.	3 Com.	Error.
Of 12 parts	32.549	0.091	18.599	0.636 +	12.950	0.727 -
19	32.304	0.336	17.620	0.343 -	14.684	0.004 +
31	32.399	0.241	17.999	0.036 +	14.400	0.277 -
43	32.440	0.200	18.167	0.204 +	14.273	0.404 -
50	32.363	0.277	17.855	0.108 -	14.508	0.169 -
53	32.637	0.000	17.897	0.066 -	14.740	0.063 +
55	32.464	0.176	18.261	0.298 -	14.203	0.474 -
Com. Temp.	32.390	0.250	17.963	0.000	14.427	0.250 -
1st Salin.	32.307	0.333	17.630	0.333 -	14.677	0.000
2d Salin.	32.354	0.286	17.520	0.143 -	14.434	0.143 -
True Scale.	32.640	0.000	17.063	0.000	14.607	0.000

Temperaments formed by the division of the octave into equal parts, may be called geometrical temperaments. The common, and the two mentioned by Salinas, do not proceed upon this foundation; the intention of the first inventors not having been to make transpositions to every note of the system equally good; but only to make the most usual transitions in the course of a piece of music tolerable. Hence the parts of the octave, in their supposition, were not all equal.

The common temperament, as we have said, preserves the third major perfect. The first of Salinas preserves the third minor perfect. In the second of Salinas, the semitone minor is perfect. The foundation of his first temperament is making the temperate tone equal to the tone minor and  $\frac{1}{3}$  of a comma, or the tone major less  $\frac{2}{3}$  of a comma. Hence his fifth and third major will be deficient by  $\frac{1}{3}$  of a comma; and the third minor consequently will be true. The ground of his second scheme is, to add  $\frac{1}{3}$  of a comma to the tone minor, or take  $\frac{1}{3}$  from the tone major for his temperate tone. Hence the fifth will be deficient by  $\frac{1}{3}$  of a comma, and the thirds major and minor each deficient by  $\frac{1}{3}$  of a comma. Consequently, the semitone, being their difference, will be preserved.

As to Mr. Salmon's scale in the Philosophical Transactions, there is nothing true in it, but the diatonic scale of C. His scale for A is false, the fourth being erroneous by a comma: most of his semitones are likewise false. In

short, it can neither be considered as a true scale, nor as a temperament.

Before we close this article, it may be proper to add a few words about the method of invention of the foregoing geometrical temperaments. M. Huygens having had the hint of a division of the octave into 31 parts, had nothing farther to do but to examine it by logarithms. But supposing no such hint had been given, he might have investigated it directly, by the method laid down by himself, and also by Dr. Wallis and Mr. Cotes, for approximating to the value of given ratios in smaller numbers. We have given Mr. Cotes's method under RATIO. The application of that method to the present purpose is thus: the ratio of the octave to the third major is 55.79763 to 17.96282, and the approximating ratios will be,

1. Greater than the true 28 : 9, 87 : 28, &c.

2. Less than the true 3 : 1, 31 : 10, 59 : 19, 205 : 66, &c.

The ratios greater than the true must all be rejected; because they give the third major less than true, and consequently the tone (its half) deficient by above  $\frac{1}{3}$  of a comma; which gives the fifth deficient above  $\frac{1}{3}$  of a comma: but this ought not to be. The first of the ratios less than true is 3 : 1, or 12 : 4, which is the temperament of 12 parts before described, and too inaccurate. The next is 31 : 10, or M. Huygens's. The rest divide the octave into 100 many parts.

The same may be also found thus: the ratio of the octave to

to the common temperate fifth, deficient by  $\frac{1}{4}$  of a comma, is 56.79763 to 32.38952. The approximating ratios to which are,

1. Greater than the true 2 : 1, 7 : 4, 19 : 11, 50 : 29, &c.
2. Less than the true 1 : 1, 3 : 2, 5 : 3, 12 : 7, 31 : 18, 205 : 119. Where we have the temperaments of 12, 19, 31, and 50 parts, before examined.

And here all ratios greater than the true ought to be rejected, because they give the fifth less than true, that is, in this case, deficient by more than  $\frac{1}{4}$  of a comma.

If we investigate the approximating ratios to the ratio of the semitones major and minor, or 5.19529 to 3.28612, we shall have the ratios 1 : 1, 2 : 1, 2 : 2, 5 : 3, which respectively give the temperaments of 12, 19, 31, and 50 parts, before described.

Again, investigating the approximating ratios of the fifth to the third major, we shall find 7 : 4, 9 : 5, 11 : 6, 29 : 16, which will also give the temperaments 12, 19, 31, 50, as before.

Lastly, the approximated ratios of the octave to the true fifth are 12 : 7 and 53 : 31 greater than the true; the others being of no use, since the fifth must necessarily be diminished. Here we find the temperament of 53 parts. As to the temperaments of 43 and 55, being destitute of any musical foundation, it is no wonder they do not appear by this method of investigation.

M. Huygens, in his *Cosmotheoros*, says that the tone or pitch of the voice cannot be preserved, unless the consonants be tempered, so as to deviate a little from the highest perfection. For the proof of this assertion, he brings a melody consisting of the following sounds, C, F, D, G, C; where, if the intervals were to be sung perfect, by taking the interval from C to F a true fourth ascending, from F to D a third minor descending, from D to G a true fourth ascending, and lastly, from G to C a true fifth descending, we should fall a comma below the C from whence we began. Therefore, if we were to repeat this series of notes nine times, we should at last fall near a tone major below our first found.

M. Huygens's solution of this difficulty is, that we remember the note from whence we set out, and return to it by a secret temperament, thereby singing the intervals a little imperfect; which, he says, will be found necessary in almost all songs or melodies.

A like difficulty is mentioned in the *Memoirs of the Royal Academy of Sciences*; and is there urged for the necessity of a temperament, even for singing in the same key. And M. Huygens's solution of the difficulty is there approved. *Ann.* 1707, p. 264.

But the solution of these learned gentlemen is, as yet, far from being decisive. No experiment has yet been brought to shew that the human voice sings tempered notes; not even when accompanied by tempered instruments. It seems to us, on the contrary, that an exercised voice, guided by a good ear, sings true, even though accompanied by a mistuned instrument, as harpsichords most frequently are, especially in transposed keys. And were these instruments always as well tuned as art could make them, yet their tones would be equal; and it seems evident to the ear, that the human voice singing naturally two tones in succession, as C, D, E, never makes them equal; and cannot, without great difficulty, and by means of a variation of harmony, be brought to make them equal.

Another solution, therefore, of M. Huygens's difficulty, must be sought for. The truth seems to be, that the second of the key must be the true tone major above the key and therefore the third between the second and fourth of the

key must be sung deficient by a comma. Thus in the key of C, from C to D will be a tone major =  $\frac{9}{8}$ , and from D to F will be a deficient third =  $\frac{4}{3}$ . See INTERVAL.

M. Huygens's melody, therefore, will stand as follows:

$$\left\{ \begin{array}{cccccc} C & F & D & G & C \\ \frac{4}{3} \times \frac{4}{3} \times \frac{4}{3} \times \frac{4}{3} = 1 \end{array} \right\}$$

And the voice would sing the interval F, D, just as if the note E had been interposed; in which case the notes would be

$$\left\{ \begin{array}{cccccc} C & F & E & D & G & C \\ \frac{4}{3} \times \frac{4}{3} \times \frac{4}{3} \times \frac{4}{3} \times \frac{4}{3} = 1 \end{array} \right\}$$

These notes all come within the diatonic scale of C; and the voice naturally falls upon the note from whence it set out. The same answer will hold in the example mentioned in the *Memoirs of the Academy of Sciences*; where the intervals bB, G, E, C occur. And here the interval from bB to G should be taken =  $\frac{3}{2} = \frac{4}{3} \times \frac{4}{3}$ , as in the former example; and for the same reason, the key being F.

There seems, therefore, no repugnancy between the practice and theory of music, while the melody is confined to one key; but it must be owned, that in transitions from key to key, especially where several parts are to make harmony with each other, there still remain difficulties, not mentioned by M. Huygens, or any other writer we know of, which might deserve a farther examination.

We must not omit mentioning, that the learned Dr. Smith, in his *Harmonics*, has not only carried the theory of temperaments far beyond all the authors that preceded him; but has shewn how to tune an instrument according to any proposed temperament, by the ear only, which is certainly a most ingenious discovery.

This learned author prefers what he calls the temperament of equal harmony, which differs insensibly from the division of the octave into fifty parts, to all others; and insists, that it labours under the fewest defects, and is of all others the most agreeable in practice. In the system of equal harmony, the temperaments of the fifth, third major and third minor, are respectively  $\frac{1}{15}$  and  $\frac{1}{18}$  and  $\frac{1}{18}$  of a comma less than the truth.

It would be impossible here to do justice to the learned author's reasonings on this subject; we shall only add, that he establishes, contrary to the common opinion, that the less simple consonances, generally speaking, will not bear so great temperaments as the simpler consonances.

Dr. Smith mentions a temperament communicated to him by the ingenious Mr. Harrison, which consists in making the proportion between the octave and third major equal to that of the circumference of a circle to its diameter. In this temperament the third major is diminished by  $\frac{2}{3}$  of a comma, but the third minor is very near the truth, and extremely beautiful.

A late author seems to think the division of the octave into thirty-one parts, not to be of modern invention, but necessarily implied in the doctrine of the ancients. At first sight, it would seem as if the ancients made but twenty-four dieses or divisions in the octave, viz. ten to each fourth, and four to the tone; which (the octave being equal to two fourths and a tone) gives twenty-four dieses to the octave. But the author just quoted contends, that this division is to be understood only in one tension, that is, either ascending or descending; but that, accurately speaking, if we consider all the dieses, or divisions of the fourth, both ascending and descending, we shall find thirteen; five to each tone, and three to the semitone major; and consequently thirty-one divisions in the octave. These, indeed, are not all naturally equal; but if we make them so, we

shall have a temperament known by the moderns under the name of Huygens's temperament. Dr. Pepusch, in Phil. Trans. N<sup>o</sup> 481. p. 273. See the article *DIESIS*.

Such was the history and theory of temperament about half a century ago. But as our keyed and wind instruments have extended their compass and powers, and all the ancient laws of relative modulation are disregarded by modern composers, most practical musicians incline to equal harmony, in which all the keys participate of the imperfection of the scale when the octave is confined to twelve semitones, of which every one occasionally serves for two or three different purposes. As the note A natural, for instance, is sometimes B double flat, and sometimes G double sharp, E natural is obliged to officiate for D double sharp, and sometimes for F flat.

There are, however, theorists who calculate, but never listen, and who think temperament an abomination, a deadly sin against Pythagoras and his *triple progression*. Now as it is generally agreed that the ancients had no simultaneous harmony, or music in parts, and allowed of no consonances but the unison, octave, 4th, and 5th, they did wisely to make them as perfect as possible; but since the invention of counterpoint, and new instruments of six tones by keys, frets, and additional ventages, which furnish but twelve semitones, whereas thirty-one different sounds are wanting to supply two distinct sounds for synonymous notes, such as A\* and B♭, C\* D♭, D\* E♭, &c. temperament, though it a little diminishes the perfection of certain notes, the whole instrument is bettered by it, and rendered equally fit for all keys. Every concord, except the unison and octave, has a latitude, and allows of *bearings* without offending the ear. A perfect 5th makes an intolerable major 3d below it. And as the 3d, though called an imperfect concord, is the most grateful and pleasing of all the concords when perfect; contrapuntists do wisely to allow tuners to rob 4ths and 5ths of a little of that perfection which they can spare without injury, for the good of the whole. If the learned harmonist, the abbé Roullier, is living, this relaxation of Pythagorean discipline, and want of due respect for the *triple progression*, will, we fear, disturb and render him somewhat intemperate in censuring our *absurdity*.

We have always regarded music as an object for the ear, and wish to make it as pleasing to that sense as possible; and have been so long accustomed to tempered scales, as to receive more pain than pleasure from music performed on an instrument tuned by perfect 5ths throughout, that is, by the *triple progression*. We shall, however, prescribe no exclusive method of tempering the scale; as almost every man who tunes his own instrument has a system of his own: we shall only observe, that the greatest musicians in the course of their lives have often changed their method. In our cathedrals and parish-churches in general, where the natural keys are made as perfect as possible, at the expence of A♭, D♭, F\*, and C\*, keys that have never been admitted within the pale of the church, organists that hear little other music, are extremely offended by equal participation of the scales, when the pure harmony of their favourite keys is defined by temperament: and those accustomed to the levelling system of equal harmony, on the contrary, hold the *wolf* in as much abhorrence, as they would the destructive wolf in the Gevauden. At present, our tuners mitigate the extremes of equal and unequal temperament, by favouring the natural keys, and making the extraneous or transposed keys somewhat less perfect; but devoting the *wolf* to total destruction.

It is imagined by many, that the character of keys, par-

ticularly the minor, depends on the imperfection of the scales, occasioned by unequal temperament: as F minor is plaintive, E♭ solemn, and E\* brilliant. But though the difference between the pitch of E♭ and E\*, D\* and E♭, is but half a note, whatever may be the general pitch of the instrument, whether half a note too high, or half a note too low, these keys still retain their character, it should seem not from the tuning or elevation of the general system, but from something for which we are unable to account. See *MUSIC*, and *SOUND*.

TEMPERATE ZONE. See *ZONE*.

TEMPERATURE, in general, denotes the degree of free caloric which a body appears to possess when compared with other bodies; or, in other words, the state of a body in relation to its capability of producing in other bodies the effects arising from the presence of free caloric. Sir Humphrey Davy defines temperature to be "the power bodies possess of communicating or receiving heat, or the energy of repulsion." But this definition appears to us to be a little ambiguous, for temperature is not a term indicative of a positive faculty in bodies, as this definition may be understood to mean; but, as before observed, is merely a relative term, expressive of the degree in which bodies, in conformity to the grand law of the equal distribution of free caloric, can affect, or be affected by other bodies of a lower or higher temperature, that is, possessing more or less free caloric than themselves.

There are two means of measuring the temperature of bodies, namely, by our sensations, or by the different degrees of expansion produced in bodies on being subjected to different degrees of free caloric. The first of these, from various obvious causes, is so imperfect and limited, that no dependence can be placed upon it as a measure of temperature. The second is much more regular and extensive, and is, therefore, always at present employed. "When two bodies produce the same increase or diminution of volume in a third body, to which they are equally applied, they are said to be of the same temperature; and any body is said to be at a higher or lower temperature, as it produces a greater or less expansion in another body with which it is in contact." Instruments founded upon the principle of the expansion of bodies by heat, and destined to measure degrees of temperature, are called *thermometers*, or, when the temperature is very high, *pyrometers*; which see. Under the same heads also the important question is discussed, how far the expansion of bodies by heat is to be considered as an indication of their real temperature. See also *CALORIC*.

TEMPERATURE of the Atmosphere. See *ATMOSPHERE*.

TEMPERATURE of Climate. See *CLIMATE*.

TEMPERATURE of the Earth, is that degree of sensible heat which exists on the surface, or in the interior of the solid part of the globe. The temperature of the atmosphere is frequently described as the same with the temperature of the earth, from which it is essentially distinct. The sensible heat of the atmosphere varies with the latitude, the season, and the elevation of the place in which the observation is made. The superficial temperature of the earth varies also with the latitude and the season, and in a still greater degree if the land be dry; but the internal temperature of the earth appears to be permanent in each place throughout the whole year. At a certain depth under the surface, the thermometer always indicates the same degree of heat; and the difference between the permanent internal temperature in different latitudes, is much less than that which exists at the surface. The depth at which the thermometer remains stationary about latitude 52°, is 80 feet: nearer to the equator,

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equator, or the poles, a greater depth would be necessary to obtain the permanent temperature. At still greater depths, probably, the temperature under each degree of latitude is the same all over the globe, except in the vicinity of volcanic fires.

M. Volney, in his travels through North America, speaking of the temperature of the earth, endeavours to oppose the opinion of its permanent internal temperature. Setting out from lake Superior, he says, and proceeding west to the Stoney mountains, and travelling north as far as latitude  $72^{\circ}$ , the country now well known to the Canadian traveller, displays a climate that for severity of cold can be compared only to Siberia. From latitude  $46^{\circ}$ , the earth is frozen during the whole year. At several trading posts between latitude  $50^{\circ}$  and  $56^{\circ}$ , it was found impossible to have wells. Mr. Shaw had attempted to dig one at the post of St. Augustin, about forty miles from the mountains; but though it was in the month of July, the ground was frozen at the depth of three feet from the surface, and as it grew harder he was obliged to give up the attempt. He relates also an account of Mr. Robson, an English engineer, who attempted to sink a well at Prince of Wales's fort, latitude  $59^{\circ}$ , in the month of September. He first found thirty-six inches of earth thawed by the preceding warm weather, then a stratum of eight inches frozen as hard as a stone; under this a stratum of sandy friable earth, frosty and very dry, in which his borer could find no water. The celebrated traveller Ledyard, says Volney, affirms, that at Yakutsk, not so high as latitude  $62^{\circ}$ , wells of water cannot be obtained, because it is found by experiment that water freezes at the depth of sixty feet. From these circumstances, M. Volney would infer that the internal part of the earth is in a constant state of congelation. Some of the above observations, we believe, were inaccurately made; and it has been too hastily determined, that the earth is frozen during the whole year in North America, even in latitude  $46^{\circ}$ ; for this is not the case  $11^{\circ}$  further north. We have been favoured with the following statement from an intelligent medical gentleman, who was some years resident in Hudson's Bay. "On digging a well at York fort, Hudson's Bay, latitude  $57^{\circ} 7'$ , in the beginning of October, the following circumstances were remarked. About thirty inches from the surface, a bed of frozen earth, about twelve inches thick, was met with: below was a bed of loose sandy clay, about half a yard thick, which was succeeded by a bed of the same clay, rendered perfectly hard and solid by frost. Sinking lower, similar beds of frozen and loose earth were found, alternating with each other; the frozen beds, however, constantly decreasing in thickness, though not regularly, and at a certain depth they seemed to disappear entirely. These frozen strata are considered by the inhabitants as indications of the severity of the preceding winters, each stratum being supposed, with much probability, to be formed in different years, and to be travelling downward until they are thawed by the internal temperature of the earth. The process by which they sink down may be explained, on the supposition that the upper surface is diminishing by heat during summer, and the under surface increasing by the congelation of moisture in contact with it. Another circumstance, which took place in the same latitude, may serve to elucidate the observation of Ledyard, that the water was constantly frozen at sixty feet under the surface at Yakutsk." A well had been sunk which yielded a plentiful supply of water during the first summer; but the water, being exposed to the air, froze during the next winter, and remained frozen ever after, being too far below the surface to be thawed. Hence it appears that water

exists unfrozen at a moderate depth under the surface in the coldest climates, when it has no communication with the external air. The effect of the summer heat in the same latitude extends about seventeen inches under the surface, where the ground has been shaded; but where it has been exposed to the sun, the surface is thawed to the depth of three feet. From the small depth to which the solar heat penetrates, we may infer that the water below is kept in a fluid state by the internal heat of the globe. It has been generally supposed, that the permanent temperature of each latitude is the same nearly as the mean annual temperature of the atmosphere, and that this is indicated by the temperature of springs or deep wells; but the temperature of springs will vary with that of the strata near the surface through which they run. (See *TEMPERATURE of Springs*.) It is to be regretted that more numerous observations have not been made on the temperature of deep mines. From observations recently made in Cornwall, it appears that the temperature increases with the depth, at least in some of the mines, and in the lowest it was not less than  $70^{\circ}$ . This may, perhaps, be owing to the chemical changes which are taking place; for it appears, from the evidence of the overseers of the mines, in reply to certain queries proposed by the Royal Geological Society of Cornwall, that the water is found constantly warmer in the vicinity of veins of copper-ore, than it is in the vicinity of tin-ore: the former veins are in general worked to a greater depth than the latter. It remains to be ascertained whether this increase of temperature be owing to chemical causes, or is invariable at the same distance from the surface. The decomposition of pyrites in copper veins would seem to point out a cause for the increased temperature in their vicinity; it is evident, however, that it is not derived from the solar rays. It seems reasonable to believe, from what we at present know of the internal temperature of the earth, that there exists a permanent source of heat within the globe, though we are unacquainted with the causes by which it is generated. We are equally ignorant of the causes by which light is generated on the surface of the sun: one operation is not more surprising or inexplicable than the other; nor is the difficulty removed, by supposing the sun to be surrounded with a luminous atmosphere. Some philosophers have maintained the opinion, that the earth has been constantly growing colder since the period when it was first inhabited, and that the organic remains of elephants and other animals, (supposed to be similar to those of tropical climates,) which are found in Siberia, offer a demonstrative proof, that the arctic regions once enjoyed the temperature of the torrid zone. It has since been ascertained, by the elaborate researches of M. Cuvier, that these animals were not of the same species as the African or Asiatic elephant. A most convincing proof of this was afforded by the entire body of one of these elephants, which was discovered imbedded in ice near the mouth of a river in the north of Siberia, by a Tungusian fisherman, in the year 1799. It first presented a shapeless mass projecting from an ice-bank. Two years afterwards he could distinctly see that it was the body of an enormous animal; the entire flank and one of its tusks had become disengaged from the ice. In 1803, the ice beginning to melt earlier than usual, the whole body was disengaged, and fell from the ice-bank on the sandy shore. In 1806, Mr. Adams went to examine this animal, which still remained on the sand, but its body was much mutilated. The skin was extremely thick and heavy, and as much of it remained as required the exertions of ten men to carry away. More than thirty pounds of the hair and bristles of the animal were collected. Some of this

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this hair was presented to the Museum of Natural History in Paris. It consists of three distinct kinds. The one is stiff black bristles, a foot or more in length; another kind is a coarse flexible hair, of a reddish-brown colour; the third kind is a coarse wool, which grew among the roots of the long hair. These afford undeniable proof, that this animal belonged to a race of elephants inhabiting a cold region, and was not fitted to dwell in the torrid zone. This animal was a male, and had a long mane on its neck. The bones were all perfect. As the only proof offered for the refrigeration of the earth was the former existence of tropical animals in northern latitudes, and as this can no longer be maintained, we have reason to believe that the general temperature of the globe is stationary, though the climate of particular countries may vary at different periods, from cultivation, the destruction of large forests, or other local causes.

Though the annual changes in the temperature of the climate affect the surface only to a small comparative depth, yet the continued effect of the annual mean temperature, considered as a permanent cause, may be sufficient to keep the internal temperature of the earth stationary, in each latitude, at a still greater depth. Hence we find that the internal temperature of the earth, and the mean temperature of the atmosphere, are nearly, but not exactly, the same; for in all northern countries, the mean temperature of the earth is higher than that of the air, and the difference, according to the observations of Dr. Wahlenberg, fellow of the Royal Society of Stockholm, appears to increase as we advance northward, or as the cold of the winter becomes more severe. This would also seem to give additional confirmation to the opinion, that there is a permanent source of heat within the globe itself. The following table shews the rate at which the temperature varies according to the latitude.

	Latitude.	Temp. of the Earth.	Mean Temp. of the Atmosphere.
Berlin - - -	52.5°	49.28°	46.4°
Carlstrom - - -	56.25	47.3	42.03
Upsala - - -	60.	43.70	33.38
Umen - - -	64.	37.22	
Degeforts - - -	64.25	36.68	

The observations were made on springs which threw up a large quantity of water at a permanent degree of temperature in all seasons. It is to be regretted that we have not a series of observations made with equal care in southern latitudes. M. Volney states, in his "Travels in America," that the mean temperature of wells forty-five feet deep was as under:

	Fahr.
Charlestown - - -	63°
Virginia - - -	57
Philadelphia - - -	53
Massachusetts - - -	49
Vermont - - -	44

This depth is too small, to give the true mean temperature of the earth; and the observations can only be regarded as approximations to the truth. On the same authority it is stated, that the temperature of the earth, to a considerable depth under the torrid zone, is 14° Reaumur, or 63° Fahrenheit.

In the southern parts of England, the mean temperature, taken from permanent springs, is about 48°; at Edinburgh, 45°; in the north of Ireland, 48°; and at Paris, 51°.

For the temperature of the atmosphere, see *ATMOSPHERE*, where the mean temperature in different latitudes is given. Mr. Humboldt has lately published a botanical account of the new genera and species of plants discovered in the tropical regions of America, with many interesting observations on the temperature, as affecting the growth of plants. The plants of the torrid zone extend farther through the southern temperate zone than through the northern, owing to the greater influence of the ocean in the southern hemisphere, in moderating the rigour of winter; the ocean bearing a much greater proportion to the surface on the south, than on the north side of the equator. In estimating the climate suited for the growth of particular plants, the mean temperature will not afford a correct standard; for though the mean temperature of the year, in the middle latitudes of North America, be the same as it is in Europe, 7° further north, the temperature of different seasons in these same latitudes by no means agrees. The winters are colder, and the summers hotter, in North America than in Europe. In Philadelphia the summer is as hot as at Rome or Montpellier, while the winter corresponds with that at Vienna. At Quebec the summer is warmer than at Paris, but the winter colder than at St. Petersburg. In the north of China there is a still greater difference between the heat and cold, than in North America.

In North America, as far as latitude 48°, the summers are four centigrade degrees, or about 7° Fahrenheit, hotter than in the corresponding latitude in Europe. Between the tropics, the mean annual temperature is the same as on the old continent, which may be seen in the following table, expressed in degrees of the centigrade thermometer.

	Old Continent.	New Continent.
Senegambia	26.5°	Cumana 27.7°
Madras	26.9	Antilles 27.5
Batavia	25.2	Vera Cruz 25.6
Mantilla	25.6	Havannah 25.6

Twenty-five degrees correspond with seventy-seven degrees of Fahrenheit.

Though the plants of the torrid zone extend farther through the southern temperate zone than through the northern, as we have before stated; yet to a certain distance from the line, the temperature appears to be less on the south than on the north side. Rio Janeiro and Havannah are nearly at the same distance from the equator; but the mean temperature of the summer and winter months in each is as under:

	Rio Janeiro.	Havannah.
June	20.0°	December 22.1°
July	21.2	January 21.2
January	26.2	July 28.5
February	27.0	August 28.8

On the coast of Peru, the temperature is diminished by the perpetual cloudiness of the sky, and by a strong sea current setting in from Cape Horn. From the tropic to 34° of south latitude, the mean temperature of the southern hemisphere scarcely differs from that of the northern. Between latitude 34° and 57°, there is a greater difference between the temperatures of summer than of winter: the winters in the southern hemisphere are not colder, but the summers are considerably more so than in the northern hemisphere. In south latitude 48°, the summer temperature is the same as the winter temperature of Toulon, Cadiz, and Rome.

The higher we ascend above the level of the sea, and the farther we advance from the equator, the greater is the difference

## TEMPERATURE.

ference between the temperature of different seasons of the year. The following table exhibits the temperature between the hottest and coldest months, in different latitudes.

	Lat.	Cent. Therm.
Cumana - - -	10.27°	2.4°
Vera Cruz - - -	19.11	2.6
Havannah - - -	23. 8	7.4
Natches - - -	31.28	17.4
Philadelphia - - -	39.56	24.6
Quebec - - -	46.47	33
Nain - - -	57.00	35

In the temperate zone, as we advance northwards, the coldness of the winter increases at a much greater rate than the heat of the summer diminishes. Thus at Enonlekis, in latitude 68° 30', the temperature of July is as hot as that of Edinburgh. Between the tropics, the temperature at no season of the year equals that of the sea-shore; but in the temperate zone, the upper currents of air are sometimes warmer than the lower, during the winter months; and the thermometer, on the summits of hills, is occasionally three or four degrees higher than in the plains. Hence in the temperate zone, we find the same plants frequently on low and elevated situations; but this is never the case between the tropics. In the temperate zone on the old continent, when

the mean heat of the month is as under, the following plants blossom:

Fahr.
42°, the <i>Amygdalis persica</i> ,
47, the <i>Prunus domestica</i> ,
52, the <i>Betula alba</i> .

The reason why plants vegetate with greater rapidity in Lapland and Norway than farther south, is owing to the increment of temperature being much greater, and to the temperature of the earth in winter being several degrees above that of the air.

From observations made in different latitudes, it appears that 1000 fathoms of altitude occasion a diminution of temperature equal to 23° of Fahrenheit; 50 fathoms being nearly equal to half a degree. Mountains 1000 fathoms in height, at 46° of latitude, have the mean temperature of Lapland; and mountains of the same height between the tropics enjoy the temperature of Sicily.

The following table by Humboldt exhibits the most remarkable circumstances respecting the temperature in the three zones. The temperature is taken according to the centigrade thermometer. The fathom 6 French feet, or 6.39453 English feet.

	Torrid Zone.		Temperate Zone.			Frigid Zone.
	Andes, Quito, Lat. 0°.	Mountains of Mexico, Lat. 20°.	Caucasus, Lat. 42½°.	Pyrenées, Lat. 42¼°.	Alps, Lat. 45½° to 46°.	Lapland, Lat. 67° to 70°.
Inferior limit of perpetual snow - - - }	2460 fa.	2350 fa.	1650 fa.	1400 fa.	1370 fa.	550 fa.
Mean annual heat at that height - - - }	1½°	- -	- -	- 3½°	- 4°	- 6°
Mean heat of winter, ditto	1⅓°	- -	- -	- -	- 10°	- 20½°
Mean heat of Aug. ditto	1¾°	- -	- -	- -	+ 6°	+ 9½°
Distance between trees and snow - - - }	600 fa.	350 fa.	650 fa.	230 fa.	450 fa.	300 fa.
Upper limit of trees -	1800 fa.	2000 fa.	1000 fa.	1170 fa.	920 fa.	250 fa.
Last species of trees towards the snow - }	<i>Escalonia albonia</i> .	<i>Pinus occident.</i>	<i>Betula alba</i> .	<i>Pinus rubra</i> . <i>P. uncin.</i>	<i>Pinus abies</i> .	<i>Betula alba</i> .
Upper limit of the <i>Eri-cinæ</i> - - - }	<i>Befariae</i> . 1600 fa.	- -	<i>Rhodod. caucas.</i> 1380 fa.	- -	<i>Rhodod. ferrug.</i> 1170 fa.	<i>Rhodod. laponicum.</i> 480 fa.
Distance between the snow and corn - }	800 fa.	- -	630 fa.	- -	700 fa.	450 fa.

In the seventh volume of the Transactions of the Royal Society of Edinburgh, Dr. John Murray has published a paper on the diffusion of heat on the surface of the earth; in which he attempts to prove, from the nature of caloric, that the temperature of the earth is constantly increasing from the solar rays, and that this temperature is becoming more equal in different parts of the earth. The atmosphere, he contends, conveys no heat into unlimited space; our planet, in relation to the discharge of caloric from it, is bounded as it were by a wall of iron-conducting matter. He admits,

however, that a small portion of heat may be lost by radiation: thus, at the hotter parts of the earth's surface, there may be some emission of caloric by radiation; but this, he says, cannot be equal to the quantity communicated by the solar rays: for of the heat derived from the latter source, a portion is absorbed by the earth, and conveyed to the interior, as is apparent from the decreasing temperature, as we recede from the surface to a certain depth; and another portion is carried off by the ascending current of heated air, and conveyed to colder regions, where it is absorbed. Thus,

EVER

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even from those parts of the surface of the earth where the circumstances are most favourable to radiation, the quantity radiated cannot be equal to the quantity received from the solar rays. Over the whole earth the diffusion must be still greater; and instead of the conclusion, that the planet discharges its excess of heat by radiation, there is every reason to draw the opposite conclusion, that part of the heat which it receives from the sun is retained. He further infers, that the temperature of the globe must rise, from the mode in which heat is communicated to it by the sun; and at the same time, as it advances, must become more equal over the whole surface. And this rise has its limits. There cannot be either unlimited increase of heat, or unlimited refrigeration; but the final result will be a state of permanence and uniformity, the continuance of which is secured by the very circumstance, that if it is deviated from, this deviation must correct itself by an increase of radiation from the hotter parts, or from an increased absorption of caloric by the colder parts of the globe. According to this theory, in process of time, the equatorial and polar parts of the globe will arrive at the same degree of temperature, which will remain stationary, as there will be no circulation of heated air or water to the poles. To this reasoning we conceive it may be objected, that it assumes, without sufficient grounds, that caloric cannot pass from the earth into unlimited space, and that the solar heat does not become latent by chemical union with terrestrial substances. It assumes also, that caloric is a distinct specific substance; an opinion which is denied by some of the most eminent philosophers. Nor have we, perhaps, any evidence to prove that the temperature of the earth has changed since the earliest records of history, if we except the local changes which result from drainage and cultivation. It is well known that the climate of Europe is materially changed since the periods of ancient history, when the Danube was annually frozen, and would admit the passage of armies over the ice. The climate of the United States of America has also undergone a material change during the last century. Both these local changes have been produced by the same cause, the destruction of extensive woods, and the progress of agriculture; but, independently of local causes, we have no data to infer that the temperature of the globe is increasing or diminishing.

*TEMPERATURE of the Sea.* The temperature of the sea near the surface is affected by the changes of temperature of the atmosphere, and by the currents which traverse it. The currents which flow from the equatorial to the polar regions, serve to equalize the heat of different latitudes. This is remarkably the case with the current called the Gulf stream, which passes by the shores of Mexico, Louisiana, and Florida, and round the point of the peninsula, under the shelter and protection of the Bahama islands, which break the efforts of the ocean and the current of the trade wind. This stream, on entering the ocean, preserves its water by the velocity of its current, and may be further distinguished by its colour and temperature. The temperature is from eleven to twenty-two degrees higher than that of the ocean. From the Floridas to Newfoundland the current continues increasing in breadth, and diminishing in velocity. Some experiments made by Mr. Jonathan Williams, give the difference of temperature between the Atlantic ocean and the Gulf stream as under, December, 1789.

	Fahr.
Soundings in shoal-water, on the coast, - - -	47
A little before entering the stream, - - -	60
In the stream, - - -	70
Before reaching Newfoundland, in the stream, - - -	66
At Newfoundland, out of the stream, - - -	54
Beyond the banks, in the open sea, - - -	60

	Fahr.
On approaching the coast of England, - - -	48°
Capt. Billings, in 1791, found the temperature of } the sea on the coast of America, - - - }	61
In the water of the Gulf stream, - - -	77

In winter, Mr. Williams found the variation between the Gulf stream and the ocean 23°; the difference, as might be expected, being less in summer than in winter. These inquiries have ascertained another fact, from whence navigators may derive some advantage; for by examining the temperature of the sea in different places, it has been found that the water is colder in proportion to its shallowness; and hence may be derived an indication of the approach to land, or to a shoal. Out of the reach of currents, a difference always exists between the temperature of the surface and the lower parts of the sea. In northern latitudes, the surface is sometimes warmer and sometimes colder than the lower parts; but near the equator, the temperature of the surface may be expected to be invariably warmer than at great depths. In all probability, the temperature of the sea is permanent in each degree of latitude, at a certain depth. Capt. Ellis let down a sea-gage in N. lat. 25° 13'. W. long. 25° 12'. He found the sea falter and colder in proportion to the depth, till the gage had descended 3900 feet, when the mercury in the thermometer came up at 53°; but the water did not grow colder, though he let down the gage 1400 feet lower. At the surface of the sea, the thermometer stood at 64°.

From the experiments of Capt. Douglas, near the coasts of Lapland and Norway, of which an account is given in the 60th volume of the Philosophical Transactions, the following differences were observed between the temperature of the sea at the surface, and at certain depths.

Temperature at the Surface.	Depth in Fathoms.	Temperature.
May 12, } lat. 70° 40', }	36° Fahr.	78 to 87 } 39°
May 17, } nearly the same, }	37	86 to 90 } 39
May 22, } lat. 70° 32', }	37	80 } 39
June 29, } lat. 70° 54', }	44	98 } 40
July 7, } lat. 70° 45', }	46	70 } at the bottom. } 44
July 8, lat. 68° 43', } 12 leagues from the } island of Lofoot, } Norland, - - - }	47	100 } 260 } not at the } bottom. } 46 } 52 }
July 9, lat. 65° 25', } 20 or 25 leagues } from the coast of } Norway, - - - }	48	100 } 210 } at the bottom. } 46 } 48 }
July 10, lat. 64° 40', } about 30 leagues } from the coast, - }	52	75 } 141 } at the ground. } 45 } 46 }

# TEMPERATURE.

From the above observations it appears, that though the sea at a moderate depth was cooler than at the surface during the summer months in northern latitudes, yet at still greater depths the temperature increased, and at the depth of 260 fathoms was 52° in July, when the surface was only 47°. Now this depth being below the immediate effects of the solar rays, the temperature could only be derived from that of the globe itself, which appears to be sufficient to preserve the sea many degrees above the freezing point at the depth of 300 fathoms. Indeed, the temperature of the sea near the tropics, in lat. 25° 13', at the depth of 650 fathoms, appears to be the same as the temperature of the sea in lat. 68° 43', at little more than one-third of that depth, as may be seen by comparing the observations of Capt. Ellis with that of Capt. Douglas. We have hence also strong grounds for believing, that at a certain depth, the temperature of the sea is permanent, and is the same in every degree of latitude from the equator to the pole, though the depth may vary at which this permanent temperature would be found.

The mean annual temperature of the standard situation in every latitude, as deduced by Mr. Kirwan from the Atlantic and Pacific oceans, is given under the article *Temperature of the ATMOSPHERE*. But some exceptions to this standard, not there noticed, deserve to be mentioned here.

That part of the Pacific ocean which lies between N. lat. 52° and 66°, is only about 45 miles broad at its northern extremity, and 1300 miles at its southern. It is, therefore, reasonable to conclude with Mr. Kirwan, that its temperature will be considerably influenced by the surrounding high land, as well as by the many bleak islands scattered through it. Mr. K. supposes, that from these circumstances the temperature is fully four or five degrees below the standard. Small seas surrounded by land are usually rendered, from this circumstance, at least in temperate and cold climates, warmer in summer and colder in winter than the standard ocean: the gulf of Bothnia, for instance, is stated to be generally frozen in winter, but in summer to be sometimes heated to 70°. The German ocean is above three degrees colder in winter, and five degrees warmer in summer, than the Atlantic. The Mediterranean sea is, for the greater part of its extent, warmer both in summer and winter than the Atlantic, which therefore flows into it. The Black sea is colder than the Mediterranean, and flows into it.

These observations apply chiefly to the surface of the ocean: from experiments that have been made it appears, that at considerable depths the temperature is much lower than at the surface, and that the deeper we go, the lower it becomes; so that some suppose that, at very great depths, the water always exists in a state of ice. See Kirwan's "Estimate of the Temperature of different Climates;" also his "Essay on the Variation of the Atmosphere."

*TEMPERATURE of Springs.* Those common springs which throw up a considerable quantity of water during the whole year, have generally a permanent temperature, or nearly so; and this is supposed to represent the mean temperature of the earth in each latitude; but there are other springs which have a much higher permanent temperature, and some which throw up their waters at a boiling heat. The following is the permanent temperature of some of the more celebrated warm springs in Europe.

	Fahr.
Matlock, - - - -	66°
Buxton, - - - -	82
Bristol, - - - -	74
Bath, - - - -	112
Vichy, - - - -	116
	120

	Fahr.
Carlsbad, - - - -	165°
Aix, - - - -	143
Borset, - - - -	132
Bareges, - - - -	120

The Geysers or boiling fountains in Iceland, in the Azores, and in various parts of the world, have a constant temperature of 212°. The source of heat, in some of the latter springs, is evidently subterranean fire, as all those islands are of volcanic origin, and are the seats of active volcanoes at the present day. It is observed of other warm springs, that they generally rise in the vicinity of volcanic or basaltic rocks. This is the case with the warm springs of Matlock and Buxton. Rocks of basaltic amygdaloid extend through the high peak of Derbyshire, where these springs are situated. Rocks of basaltic amygdaloid, having a still more near resemblance to volcanic lava, extend from Worford bridge, in Gloucestershire, in a direction southward, and, in all probability, are continued under the surface to Bath and Bristol. According to Humboldt, hot springs rise from granite and rocks denominated primary, in various parts of South America; and, from the permanent high temperature of warm springs, we may infer that the source of heat is situated deep beneath the surface, and far below those causes which can change the temperature. It has been contended by some persons, that the high temperature of warm springs arises from the decomposition of pyritous strata; but if this were the case, the waters would be strongly impregnated with sulphate of iron and other mineral matters, which is not the fact; the temperature would also decrease as the pyritic matter became exhausted, of which we have an analogous illustration in the saline springs of Cheltenham and Gloucester. These springs rise in a deep stratum of blue clay, called *lias*, (see *STRATA of England*;) which abounds in pyrites, and in animal remains; and it is found by experience, that the saline impregnation is greatest when the wells are first opened, and that the strength of the waters gradually declines; on which account, the proprietors are under the necessity of sinking fresh wells to obtain water of the requisite saline strength. This might be expected; for as the water percolates through fissures in the clay, the saline matter in its vicinity is gradually washed away. But if the whole bed were in a state approaching to ignition, from the decomposition of pyrites, the saline impregnation would be constantly supplied to the springs; for we cannot suppose any quantity of pyritous matter to exist equal to heat a whole stratum by decomposition, without, at the same time, generating such an abundance of saline matter as must saturate the waters which percolate through it. We are hence led to infer that the source of heat in warm springs is subterranean fire, and as these springs have not been observed to diminish in temperature for a period of nearly two thousand years, we may further infer the great depth at which this source of heat is situated, an inference which is warranted by the connection which volcanoes in distant parts of the world appear to have with each other. (See *VOLCANO*.) It may be asked, if the source of heat in warm springs be subterranean fire, why are they not all of the same degree of temperature? To this it may be replied, that, in some instances, the warm springs may be intermixed with cold springs near the surface; and in other instances, after rising to a certain height, they may run in an horizontal direction for a considerable distance among the upper strata, and thus be gradually cooled. The cause which can raise up water from vast depths, must be sought for in the expansive power of steam, and elastic vapours generated by heat, which we know by experience to be fully adequate to the effect.

*TEMPERATURE for Plants, in Gardening*, the state of heat in which it is necessary to keep particular sorts of them, in order to their striking or taking root, their healthy growth, and their succeeding in the best and most proper manner. The state or degrees of heat, or the temperature, in all such cases, must be regulated and directed by the nature of the plants, their culture, and the situations in which they are grown. For those in hot-houses and stoves, the temperature, in those of the dry stove kind, should mostly be from about fifty to seventy degrees, according to the natures, habits, and manners of growth of the plants; and in those of the moist stove kind, from about sixty to ninety degrees, as the nature of the beds and plants may be. Plants in conservatories are kept at various temperatures between those of the first kind of the above stoves and that of the common open air. And in greenhouses, nearly similar temperatures are constantly to be preserved, in order to the raising, and to the growth of such plants, in the most suitable and best manner.

It is always of great utility and importance to keep the temperatures as steady as possible, whatever its state may be, in the growth of all these sorts of tender plants.

The temperatures, or states of heat for particular plants, are mostly given under their proper heads, in describing their culture.

*TEMPERATURE of Milk for Cheese, in Rural Economy*, the degree of heat which is the most proper in milk for the purpose of making cheese. From some experiments which have been lately made upon the subject, this temperature would seem to be about the middle point between that of summer and blood heat; or, perhaps, somewhere about ninety degrees of Fahrenheit's scale may give the average degree of warmth which is most proper and necessary in the business.

*TEMPERING, in the Mechanic Arts*, the preparing of steel and iron, so as to render them more compact, hard, and firm; or even more soft and pliant; according to their respective occasions.

These metals are tempered by plunging them, while red-hot, into some liquor prepared for the occasion: sometimes pure water is used for that purpose: our locksmiths, &c. scarcely use any other.

When an instrument has been properly hardened, it is necessary to give it a certain degree of softness, in order to adapt it for the purpose to which it is to be applied. With this view, it should be heated again to a certain point, usually determined by its colour, and then instantly plunged into cold water. This is called "letting it down to the proper temper." It has been a question of difficult solution, how the water acts in hardening iron and steel. It is well known, says Mr. Parkes, in his "Chemical Essays," (vol. iv.), that the hotter any piece of iron is made, and the more quickly it is cooled, the harder it will become in its texture; and he suggests that this may be owing to the loss of its latent heat. In confirmation of this conjecture he alleges, that iron and steel are generally allowed to owe their malleability to their latent heat.

A composition of divers juices, liquors, &c. has sometimes been used; which is various according to the opinion and experience of the workman: as vinegar, mouse-ear water, nettle or Spanish radish-water, the water oozing from broken glasses, suct, salt, oil, foot, distilled wine, sal ammoniac, urine, &c. But these methods are now generally abandoned. Mr. Stodart, a very ingenious and scientific cutler in London, says, (as Mr. Nicholson informs us, Journal, vol. iv. 4to.) that one of his workmen makes up his charcoal fire with shavings of leather, finding that this is effectual in pre-

venting the tools from cracking in the process of hardening; and he says, that he has found no advantage from the use of salt in the water.

To harden and temper English, Flemish, and Swedish steel, you must give them a pretty high heat; then suddenly quench them in water to make them hard; but Spanish and Venetian steel will need only a blood-red heat before they be quenched.

In consequence of this operation, all the qualities of steel are changed; so that from being very ductile and soft, it becomes so hard and stiff, that it is no longer capable of being cut by the file, but is itself capable of cutting or piercing very hard bodies, and that it does not yield to the hammer, but may be sooner broken in pieces than extended. It becomes also sonorous, brittle, very elastic, and capable of acquiring the most beautiful polish. This hardness and ductility of steel may be diversified by varying the temper. The hotter the steel is when tempered, and the colder the water into which it is plunged, the greater hardness it acquires, but at the same time it becomes so much more brittle. The coldness of the water may be increased by dissolving salts in it: observing that water is always colder while the salts continue dissolving; and that the steel will cool sooner by being stirred about or placed in a stream, so as to come in contact with water not already made warm. On the contrary, the less hot the steel is when tempered, and the hotter the water is in which it is tempered, the less hard it becomes, and also the greater ductility it retains: and the proper degree of heat is always relative to the use for which the tools made of the steel are intended.

If the steel be too hard or brittle for an edged tool, &c. let it down by rubbing a piece of grindstone or whetstone hard upon the work, to take off the black scurf: then brighten, or heat it in the fire: and as it grows hotter, you will see the colour change by degrees, in the manner and by the gradations stated under the article CUTLERY.

Saw-makers temper their tools by rubbing them over with suct or other grease, and then heating them gradually till the temperature of each tool is sufficiently raised to set fire to the grease of itself and occasion it to blaze. They are thought to acquire in this mode of treatment a temper equal to that which would be obtained by heating them in the usual way, till they became of a deep blue. This operation, which is practised at Sheffield, is called "blazing." For the method of tempering files, in which the great desideratum is to blend tenacity with hardness, see FILE.

In the year 1789, Mr. David Hartley took out a patent for a method of tempering steel by the aid of a pyrometer or thermometer applied near to the surface of the article, and at the same time recommended the use of heated oil, in which (he says) many dozens of razors or other tools might be tempered at once with the utmost facility, and the various degrees of heat necessary for different purposes might speedily be determined by experiment. (See Nicholson's Journal, vol. i. 4to.) An improvement of this principle has been since suggested by Mr. Parkes (Chem. Ess. vol. iv.) by providing a bath of oil or of some kind of fusible metal for the tempering of every species of edged tool, which contrivance would, in his opinion, give to this operation a greater degree of certainty, than has ever been experienced by those who have conducted such manufactories. See TILTING.

Steel is usually fold tempered, because in many manufactures, the custom is to temper it as soon as it is made, probably that the purchasers of it may be better able to judge of its quality. When this steel is to be used, it must be untempered by heating it more or less, and letting it cool

cool slowly, that it may be extended, filed, and receive the necessary form: after which every workman tempers it again in his own way.

M. Berthoud, in his treatise on marine clocks, recommends hardening the steel-balance wheel, by daubing it over with foot (of wood) moistened with urine, putting it into a small box of thin iron-plate, and covering it over with the same composition. This box with its contents is to be heated to a blood-red, and then the wheel taken out suddenly and quenched.

Mr. Harrison and M. Berthoud seem to agree upon the whole, that the balance-spring of time-pieces should be hardened and tempered after it has been coiled up in its proper form; and not tempered first and coiled up afterwards, as is the practice in making the main-spring. Some curious workmen, in order to equally temper small steel instruments, employ melted lead as an intermedium. A plate of iron floats upon the melted lead, and receives from it, in all its parts, an equal heat: the pieces of steel laid upon this plate, acquire all at once the same degree of heat, and are at once quenched in water; the blue or other colours, which they successively assume, affording sure marks of the proper points of heat at which they are to be quenched, according to the different degrees of hardness required in them. Lewis's Com. Phil. Techn. p. 32.

For the method of tempering steel bars for artificial magnets, practised by Mr. Canton, see *Artificial Magnet*.

The ancients appear to some to have had a better method of tempering than any of the moderns are acquainted with; witness their works in porphyry; a stone so hard, that scarcely any of our tools make any impression upon it.

*TEMPERING of Land, in Agriculture*, a term signifying the preparing it for a crop, especially of wheat. It is a term in much use in Norfolk. It implies all the various operations that may be undertaken in this intention.

*TEMPEST, TEMPESTAS*, a storm or violent commotion of the air, with or without rain, hail, snow, &c.

*TEMPEST, in Mythology*, a deity among the Romans, concerning whom we merely know, that Marcellus, as an acknowledgment for having escaped a storm, with which he was overtaken at sea, between the islands of Corsica and Sardinia, built a temple to her without the Porta Capena.

*TEMPESTA, ANTONIO, in Biography*, was an ingenious designer and painter, born at Florence in 1555, and was initiated in the art by Santi di Titi; afterwards he studied under another artist, whose name was Stradanus. Tempesta was gifted with a brilliant and powerful imagination, not, however, of the most correct or exalted kind. His favourite subjects were battles, sieges, cavalcades, huntings, processions, &c.; all of which he arranged and designed in a novel and rich style, and executed with uncommon spirit and energy. He was employed by Gregory XIII. in the Vatican, which he adorned with grotesque inventions, and some few historical productions. He was also employed by the marchese Justiniani in decorating his palace; and in several of the churches of Rome, Tempesta's paintings may be found.

He not only exercised his genius and time with the pencil, but devoted much of both to the etching needle; having left behind him nearly 1800 plates of different kinds, and of very considerable merit. He died in 1630, aged 75.

*TEMPLE, in Geography*, a town of the island of Sardinia; 25 miles E. of Castello Arragonese.—Also, a town of Mexico, in the province of Guadalajara; 500 miles N.W. of Mexico.

*TEMPLARS, TEMPLERS, or Knights of the Temple*, a

religious military order, first established at Jerusalem, in favour of pilgrims travelling to the Holy Land.

The original of this order, the first military one in the world, is this: in 1118, some pious and noble persons devoted themselves to the service of God, in the presence of the patriarch of Jerusalem; promising to live in perpetual chastity, obedience, and poverty, after the manner of canons.

The two principal persons were Hugo de Paganis, and Geoffry of St. Omers. Baldwin II. then king of Jerusalem, gave them an apartment in his palace, near the temple at Jerusalem, not far from the sepulchre of our Saviour; whence their denomination *Templars*.

Soon afterwards, the canons of the temple gave them a piece of ground near the said temple, on which to build regular houses; and the king, the lords, the patriarch, and the prelates, each gave them somewhat out of their revenue for food and cloaths.

Their first undertaking, and what they had first in view at their institution, was, to guard the highway against robbers, &c. chiefly for the safety of pilgrims and croises.

The principal articles of their rule were: that they should hear the holy office throughout every day; or that, when their military duties should prevent this, they should supply it by a certain number of pater noster: that they should abstain from flesh four days in the week, and on Fridays from eggs and milk-meats: that each knight might have three horses, and one squire: and that they should neither hunt nor fowl.

In the year 1228, this order acquired stability, by being confirmed in the council of Troyes, and subjected to a rule of discipline drawn up by St. Bernard.

In every nation they had a particular governor, called *master of the temple*, or of the *militia of the temple*. Their grand-master had his residence at Paris.

The order of Templars flourished for some time, and acquired by the valour of its knights immense riches, and an eminent degree of military renown: but as their prosperity increased, their vices were multiplied, and their arrogance, luxury, and cruelty, rose at last to such a monstrous height, that their privileges were revoked, and their order suppressed with the most terrible circumstances of infamy and severity. Their accusers were two of their own body, and their chief prosecutor Philip the Fair, of France, who addressed his complaints to Clement V. The pope, though at first unwilling to proceed against them, was under the necessity of complying with the king's desire, so that, in the year 1307, upon an appointed day, and for some time afterwards, all the knights, who were dispersed throughout Europe, were seized and imprisoned. Such of them as refused to confess the enormities of which they were accused, were put to death; and those who, by tortures and promises, were induced to acknowledge the truth of what was laid to their charge, obtained their liberty. In 1312, the whole order was suppressed by the council of Vienne. A part of the rich revenues they possessed was bestowed upon other orders, especially on the knights of St. John, now of Malta, and the rest confiscated to the respective treasuries of the sovereign princes in whose dominions their possessions lay.—The knights Templars, in order to justify the severity with which they were treated, were charged with apostacy to the Saracens, and holding correspondence with them; with insulting the majesty of God; turning into derision the Gospel of Christ; and trampling upon the obligation of all laws, human and divine. Candidates, it is said, upon admission to this order, were commanded to spit, in token of contempt, upon an image of Christ, and after admission, to worship either a

cat, or a wooden head crowned with gold. It is farther affirmed, that, among them, the odious and unnatural act of sodomy was a matter of obligation; and they are charged with other crimes too horrible to be mentioned, or even imagined. However, though there be reason to believe that in this order, as well as others of the same period, there were shocking examples of impiety and profligacy; yet that the whole order was thus enormously corrupt, is so far from being proved, that the contrary may be concluded even from the acts and records, yet extant, of the tribunals before which they were tried and examined. If to this we add, that many of the accusations advanced against them flatly contradict each other, and that many members of this unfortunate order solemnly avowed their innocence, while languishing under the severest tortures, and even with their dying breath; it would seem probable, that king Philip set on foot this bloody tragedy, with a view to gratify his avarice, and glut his resentment against the Templars, and especially against their grand-master, who had highly offended him. The principal cause of this invincible hatred against them was, that in his quarrel with Boniface VIII. the knights espoused the cause of the pope, and furnished him with money to carry on the war. Mosheim's Eccl. Hist. vol. iii. ed. 8vo. Bower's Hist. of the Popes, vol. vi. p. 393.

**TEMPLE, TEMPLUM**, a public building erected in honour of some deity, either true or false; and in which the people meet to pay religious worship to the same.

The word is formed from the Latin *templum*, which some derive from the Greek *τεμενος*, signifying the same thing; and others from *τεμνω*, *abscindo*, *I cut off*, *I separate*, because a temple is a place separated from common uses; others, with more probability, derive it from the old Latin word *templare*, *to contemplate*. It is certain the ancient augurs gave the name *templa* to those parts of the heavens which were marked out for the observation of the flight of birds. Their formula was this: *Templa tesqua sunt*.

Temples were originally all open, and hence received their name. See Phil. Trans. N° 471. sect. 5. where we have an account of the ancient temple in Ireland of the same sort as our famous Stonehenge.

The word *templum*, in its primary sense among the old Romans, signified nothing more than a place set apart, and consecrated by the augurs, whether enclosed or open; in the city, or in the fields.

Clemens Alexandrinus and Eusebius refer the origin of temples to the sepulchres built for the dead. This notion has been lately illustrated and confirmed by a variety of testimonies by Mr. Farmer, in his Treatise on the Worship of Human Spirits, p. 373, &c. Herodotus, Lucian, and Strabo, will have the Egyptians to have been the first who built temples to the gods; and from them the custom was propagated to the Assyrians, comprehending under this appellation Phœnicia, Syria, and other countries. From Egypt and Phœnicia it passed to Greece with the colonies, and from Greece to Rome. The first erected in Greece is ascribed to Deucalion by Apollonius (Argonaut. lib. iii.) and the first in Italy to Janus.

In antiquity we meet with many people who would not build any temples to their gods, for fear of confining them to too narrow bounds. They performed their sacrifices in all places indifferently, from a persuasion, that the whole world is the temple of God, and that he required no other. This was the doctrine of the magi, followed by the Persians, the Scythians, the Numidians, and many other nations mentioned by Herodotus, lib. i. Strabo, lib. xv. and Cicero, in his second oration against Verres.

The Persians, who worshipped the sun, believed it would wrong his power, to enclose *him* in the walls of a temple, who had the whole world for his habitation; and hence, when Xerxes ravaged Greece, the magi exhorted him to destroy all the temples he met with.

The Sicyonians would build no temples to their goddess Coronis; nor the Athenians, for the like reason, erect any statue to Clemency, who, they said, was to live in the hearts of men, not within stone walls.

The Bithynians had no temples but the mountains to worship on; nor had the ancient Germans any other but the woods.

Even some philosophers have blamed the use and building of temples, particularly Diogenes, Zeno, and his followers the Stoics. But it may be said, that if God hath no need of temples, men have need of places to meet in for the public offices of religion: accordingly, temples may be traced back even unto the remotest antiquity. See Hospinian, de Origine Templorum.

The Romans had several kinds of temples; of which those built by the kings, &c. consecrated by the augurs, and in which the exercise of religion was regularly performed, were called, by way of eminence, *templa*, temples. Those that were not consecrated were called *ædes*. The little temples, that were covered or roofed, they called *ædicula*; those open, *facella*. Some other edifices, consecrated to particular mysteries of religion, they called *fana* and *delubra*.

All these kinds of temples, Vitruvius tells us, had other particular denominations, according to the form and manner of their construction; as will be hereafter specified. Indeed, the Romans out-did all nations with regard to temples: they not only built temples to their gods, to their virtues, to their diseases, &c. but also to their emperors, and that in their life-time; instances of which we meet with in medals, inscriptions, and other monuments. Horace compliments Augustus hereupon, and sets him above Hercules, and all the heroes of fable; in that those were only admitted into temples after their death, whereas Augustus had his temples and altars while living.

“Præfenti tibi maturos largimur honores;  
Jurandasque tuum per nomen ponimus aras.”

Epist. ad Aug.

Suetonius, on this occasion, gives an instance of the modesty of that emperor, who would allow of no temples being erected to him in the city; and even in the provinces, where he knew it was usual to raise temples to the very proconsuls, refused any but those erected in the name of Rome as well as his own. Vide Suet. in Octav. cap. 52.

Whenever a temple was to be erected, the aruspices were consulted as to the site of it, and the time when the construction of it was to commence. The spot assigned to it was carefully purified, and it was encircled with fillets and garlands. The vestals, accompanied with young boys and girls, washed the ground with water, and the priest expiated it by a solemn sacrifice. Then he touched the foundation-stone, and bound it with a fillet; and the people, animated with extraordinary zeal, threw it in thither with some pieces of money, or metal which had not passed through the furnace. When the edifice was finished, it was consecrated with a variety of ceremonies, in which the priest, or, in his absence, some of his college, presided. Some of these temples were not to be built within the precincts of cities, but without the walls, as those of Mars, Vulcan, and Venus, for reasons particularly assigned by Vitruvius. The temples were held in great veneration; and, in some cases, they were a sanctuary for criminals and debtors. Within they were  
very

very much adorned; particularly with costly statues of their gods and great men, and a great variety of votive offerings.

The most celebrated of the ancient temples among the Pagans were the following: viz. the temple of Belus (see *BELUS* and *BABYLON*); the temple of Vulcan at Memphis, the magnificence and extent of which are highly extolled by Herodotus; the temple of Jupiter at Thebes or Diospolis; that of Andera at Hermunthis; that of Proteus at Memphis; that of Minerva at Sais; the temple of Diana at Ephesus (see *DIANA*); the temple of Apollo in the city of Miletus, which, as well as that of Diana, was of the Ionic order; the temple of Eleusis, built in honour of Ceres and Proserpine, capable of containing 30,000 persons; the temple of Jupiter Olympius at Athens, of the Corinthian order; and the temple of Apollo at Delphi, so famous for its oracles, and for the rich presents with which it was enriched (see *DELPHI*); the temple of Jupiter, which contained his admirable statue. The architect of the temple was Libo, a native of the country: its height from the area to the roof was 68 feet, its breadth 95, and its length 230. The throne and statue of the god, for we cannot enumerate other splendid ornaments, were the master-piece of Phidias; and antiquity produced nothing so magnificent nor so finished. The statue, of an immense height, was of gold and ivory, so artificially blended, that it could not be beheld but with astonishment. The god wore upon his head a crown, which resembled the olive-leaf to perfection: in his right hand he held a victory, likewise of gold and ivory; and in his left a sceptre of exquisite taste, resplendent with all sorts of metals, and supporting an eagle. The shoes and mantle of the god were of gold; and upon the mantle were all sorts of animals and flowers engraved. The throne was all sparkling with gold and precious stones. The ivory and ebony, the animals there represented, and several other ornaments, by their assemblage, formed a delightful variety. At the four corners of the throne were as many Victories, that seemed to be joining hands for a dance, besides two others that were at Jupiter's feet. The feet of the throne, on the fore-side, were adorned with sphinxes, who were plucking the tender infants from the bosom of the Theban mothers; and underneath were to be seen Apollo and Diana, wounding Niobe's children to death with their arrows. Four cross bars that were at the feet of the throne, and went from one end to the other, were adorned with a great number of figures extremely beautiful: upon one were represented seven conquerors at the Olympic games; upon another appeared Hercules, ready to engage with the Amazons, and the number of combatants on either side was twenty-nine. Besides the feet of the throne, there were likewise pillars to support it. In fine, a great balustrade, painted and adorned with figures, railed in the whole work. Panænus, an able painter of that time, had represented there, with inimitable art, Atlas bearing the heavens upon his shoulders, and Hercules in an attitude stooping to ease him of the load: Theseus and Pirithous, the combat of Hercules with the lion of Nemea, Ajax offering violence to Cassandra, Hippodamia with her mother, Prometheus in chains, and a thousand other subjects of fabulous history. In the most elevated place of the throne, above the head of the god, were the Graces and Hours, of each three in number. The pedestal which supported this pile, was equally adorned with the rest. There Phidias had engraved upon gold, on the one side, the Sun guiding his chariot; on the other, Jupiter and Juno, the Graces, Mercury, and Vesta. There Venus appeared rising out of the bosom of the sea, and Cupid receiving her; while Pitho, or the goddess of persuasion, was presenting her with

a crown. There also appeared Apollo and Diana, Minerva and Hercules. At the bottom of the pedestal, you might have seen Amphitrite and Neptune, and Diana or the moon, who appeared mounted on horseback. In fine, a woollen veil, of a purple dye, and magnificently embroidered, the present of king Antiochus, hung from top to bottom. The throne and statue reached from the pavement, which was of the finest marble, to the roof.

Italy abounded with temples as much as Greece; several of which were remarkable for their singularity or magnificence. Rome was full of temples: some of the most remarkable for their origin, materials, structure, or use, were the following: viz. the temple of Apollo, built by Augustus, in honour of his favourite deity Apollo, after his victory at Actium, upon mount Palatine. Its structure was very magnificent; it was built of the finest marble of Claros, and embellished, both within and without, with the richest ornaments. Its gates were of ivory, enriched with basso-relievos, representing the Gauls, when they were thrown headlong from the top of the Capitol by T. Manlius. In the frontispiece was a chariot of the sun, of massy gold, crowned with rays so resplendent that they dazzled the eyes of beholders. Within the temple was a marble statue of Apollo, made by Scopas, and also a colossal one of brass, 50 feet high; together with a candlestick in the form of a tree, whose branches were covered with clusters of lamps resembling fruit. Upon these branches the poets used to hang their poems, which they offered up to Apollo, as Horace informs us, ep. 3. l. 1. To this temple, dedicated to the "god of arts," was very properly annexed a noble library.—The temple of Bacchus, situated without the walls of Rome, is now the church of St. Constantia, supported on the inside by twenty-four noble pillars of granite. Its ancient mosaic ceiling, and the old window by which light was let in from the roof, still remain. Behind the present altar stands an antique urn of porphyry, of large dimensions; and on each side of the altar, a finely wrought antique candlestick of marble.—Here was the temple of the goddess Bona, who was Dryas, the wife of Faunus, distinguished by her exemplary chastity. The Roman ladies sacrificed to her in the night, in a little chapel, into which the men were not allowed to enter, nor were they permitted to be present at her sacrifices. It was for the violation of this rule, that Cicero prosecuted the debauched Clodius. (See his article.)—The temple of Diana was seated on mount Aventine. It was built in the reign of Servius Tullius, at the joint expense of the Romans and Latins, for the purpose of their meeting annually to offer a sacrifice, in commemoration of the league made between the two nations.—The first temple of Faith is said to have been erected by Numa, who taught the Romans to worship this goddess, and thus to be reminded, that the most sacred oath they could take was to swear by their *faith* or *veracity*. His intention was to render their promises, without writings or witnesses, as firm and certain as contracts made and sworn to with the greatest formalities; and in this he succeeded to his wish. Polybius bears this honourable testimony to the Romans, that they inviolably kept their *faith*, that is, their word, without having occasion for witnesses or securities; whereas nothing could bind the Greeks to their promises.—The temple of Honour was built by Mutius, by order of Marius, and might be reckoned among the noblest buildings in ancient Rome, if the materials, which were stone, had corresponded to the greatness of the design. It was remarkable for this circumstance, that the entrance of it was dedicated to Virtue, and the rest to Honour; and that it had no posticum, or back-door, as other temples had; thus intimating, that we must not only pass through virtue to attain

to honour, but that honour is also obliged to repass through virtue, that is, to persevere in it, and acquire more of it.—The temple of Janus. The Romans built, at different times, three temples to Janus; for an account of which, see JANUS.—The temple of Jupiter the Preserver was one of the sixty temples that stood upon the Capitoline hill. Jupiter Custos was represented in it, holding his thunder with one hand, and a dart with the other, and the figure of the emperor was under his thunder, to shew that he was under Jupiter's protection; or else engraved, lying upon a globe, and holding an image of victory, with the eagle at his feet, and these words, "Jovi Conservatori Augustorum nostrorum."—The temple of Jupiter Optimus Maximus, or Jupiter Capitolinus, was most commonly called the *Capitol*; which see.—The temple of Liberty was built upon mount Aventine, on the spot where Cicero's house once stood, enriched with several brass pillars, and many fine statues.—The temple of Mars stood on the declivity of the Capitoline hill. In this temple were kept the eagles and other military ensigns of the Romans, and also the chariot in which Cæsar had triumphed.—The temple of Peace was begun by the emperor Claudius, and finished by Vespasian, who embellished it with paintings and statues of the greatest masters, and also deposited in it all the spoils and riches taken by his son Titus in the temple of Jerusalem. It was burnt in the reign of Commodus.—The temple of Jupiter the Avenger was the *Pantheon*; which see. To the temples already enumerated, we might add those of Antoninus and Faustina, of Augustus, of Augustus and Bacchus, of the Muses, of Ceres, of Claudius Cæsar, of Concord, of Fame, of the Flavian family, of Faunus, of Fever, of Trajan and Neptune, of Happiness, of Faith and Jupiter the Preserver, of Flora, of Bad Fortune, of the eldest or first-born Fortune, of Public Fortune, of Virile or Courageous Fortune, of Hercules, of Juno, of Juno Moneta, of Juno Sospita, the giver or preserver of health, of queen Juno, of Jupiter Feretrius, of Jupiter Stator, of Jupiter Tonans or the Thunderer, of Jupiter the Conqueror, of Liber, an epithet of Bacchus, of the Mother of the gods, of Mercury, of Minerva, of the goddesses Nenia, of Ops and Saturn, of the Penates or Household gods, of Rest, of Quirinus, of Romulus and Remus, of Saturn, of Serapis, of the Sun, of the Sun and Moon, of the god Sylvanus, of Tellus or the Earth, of Venus, of Venus and Cupid, of Venus Erycina, of Venus Erycina and the Mind, of Venus Verticordia, of Vertumnus, of Vesta, and many others, which, great and small, amounted to upwards of one thousand.

TEMPLE, *Jewish*, at *Jerusalem*, was an edifice erected much after the model of the tabernacle, but in a much more magnificent and expensive manner. According to the opinion of some, there were three different temples: the first built by David and Solomon on mount Moriah, which was part of mount Zion; the second, by Zerubbabel and Joshua the high priest; and the third by Herod. This last, however, the Jews will not allow to be a new temple, but only the second repaired or rebuilt. The expence of building Solomon's temple was prodigious: the gold and silver employed for this purpose amounted to upwards of eight hundred millions sterling (1 Chron. xxii. 14. xxix. 4. 6, 7.), which, says Dr. Prideaux, was sufficient to have built the whole temple with solid silver. But as the book of Chronicles was written after the return from the Babylonish captivity, it is probable that the Jews might compute by the Babylonish talent, which was little more than half the Mosaic talent, or perhaps by the Syriac talent, which was but one-fifth of the Babylonish; and thus the whole quantity of gold and silver would be reduced to a com-

paratively moderate quantity, and yet sufficient for the purpose.

Josephus (lib. vii. xiv. ii.) acquaints us, that the two first sums were only one-tenth part of what is expressed in the present Hebrew; and Dr. Kennicott (State of the Hebrew Text, vol. ii. p. 355.) thinks it probable, that a cipher was added to them both in some very ancient Hebrew copy.

This temple was surrounded, except at the front or east end, with three stories of chambers, each five cubits square, which reached to half the height of the temple; and the front was graced with a magnificent portico, which rose to the height of a hundred and twenty cubits. It was plundered by Nebuchadnezzar king of Babylon, and at length destroyed, after it had stood, according to Josephus, four hundred and seventy years, six months, and ten days, from its dedication. Others, however, as Calvisius and Scaliger, reduce the number of years to four hundred and twenty-seven, or four hundred and twenty-eight; and Usher, to four hundred and twenty-four years, three months, and eight days.

The second temple was built by the Jews, after their return from the Babylonish captivity, under the direction and influence of Zerubbabel their governor, and of Joshua the high priest, with the leave and encouragement of Cyrus the Persian emperor, to whom Judæa was now become a tributary kingdom. According to the Jews, this temple was destitute of five remarkable appendages, which were the chief glory of the first temple; viz. the ark and mercy-seat, the Shechina, the holy fire on the altar, which had been first kindled from heaven, the urim and thummim, and the spirit of prophecy. This temple was plundered and profaned by Antiochus Epiphanes, who also caused the public worship in it to cease; and afterwards purified by Judas Maccabæus, who restored the divine worship: and after having stood five hundred years, rebuilt by Herod, with a magnificence approaching to that of Solomon's. Tacitus calls it *immense opulentia templum*; and Josephus says, it was the most astonishing structure he had ever seen, as well on account of its architecture as its magnitude, and likewise the richness and magnificence of its various parts, and the reputation of its sacred appurtenances. This temple, which Herod began to build about sixteen years before the birth of Christ, and so far completed in nine years and a half, as to be fit for divine service, was at length destroyed by the Romans on the same month and day of the month, on which Solomon's temple was destroyed by the Babylonians.

The Jewish temple itself consisted of the portico, the sanctuary, and the holy of holies; and it was ornamented with spacious courts, making a square of half a mile in circumference. The first court was called the court of the Gentiles, because they were allowed to come into it, but no farther. Within this was a less court, into which none but Israelites might enter, divided into the court of the women; and the inner court, in which the temple and altar stood, and into which the priests and all male Israelites might enter.

TEMPLE, in *Architecture*. The ancient temples were distinguished, with regard to their construction, into various kinds: as,

TEMPLE in *antæ*, *Ædes in antis*. These, according to Vitruvius, were the most simple of all temples, having only angular pilasters, called *antæ*, or *parastata*, at the corners, and two Tuscan columns, on each side of the doors.

TEMPLE, *Tetrasyle*, or simply *tetrasyle*, was a temple that had four columns in front, and as many behind. Such was the temple of Fortuna Virilis at Rome.

TEMPLE, *Prostyle*, that which had only columns in its front,

## TEMPLE.

front, or fore-side. As that of Ceres at Eleufis, in Greece.

TEMPLE, *Amphyprostyle*, or *double prostyle*, that which had columns both before and behind, and which was alfo tetrastyle.

TEMPLE, *Periptere*, that which had four rows of infulated columns around, and was exhaftyle, *i. e.* had fix columns in front; as the temple of Honour at Rome. See PERIPTERE.

TEMPLE, *Diptere*, that which had two wings, and two rows of columns around, and was alfo octostyle, or had eight columns in front; as that of Diana at Ephesus.

TEMPLE, *Pseudo-diptere*. See PSEUDO-DIPTERE.

TEMPLE, *Hypethros*. See HYPETHROS.

TEMPLE, *Monoptere*. See MONOPTERE.

TEMPLES, among us, denote two inns of court, thus called, becaufe anciently the dwelling-house of the knights Templars.

At the fuppreffion of that order they were purchafed by fome professors of the common law, and converted into hofpita, or inns of courts.

They are called the *Inner* and *Middle Temple*, in relation to Effex-house, which was alfo a part of the house of the Templars, and called the *Outer Temple*, becaufe fituate without Temple-Bar.

In the *Middle Temple*, during the time of the Templars, the king's treasure was kept: as was alfo that of the kings of France in the house of the Templars at Paris.

The chief officer was the master of the Temple, who was fummoned to parliament in 49 Hen. III. And from him the chief minifter of the Temple church is still called *Master of the Temple*.

TEMPLE, Sir WILLIAM, in *Biography*, a statesman and miscellaneous writer, was the son of fir John Temple, master of the rolls in Ireland in the reign of Charles I. and II., and author of a History of the Irish Rebellion, and born in London in the year 1628. Having finished his course of claffical education, he was entered, at the age of feventeen, at Emanuel college, in the university of Cambridge, under the tuition of the learned Cudworth. Being defigned for public life, his principal attention at the university was engaged by the ftudy of the modern languages, French and Spanish; and at the age of twenty, he was fent to finish his education by travelling on the continent. After fpending fix years in this way, he returned home in 1654, and married the daughter of fir Peter Osborn, of Chickland, Bedfordshire, with whom he became acquainted during his foreign travels. Declining to accept any office under Cromwell, he refided with his father in Ireland, and devoted his time to the ftudy of history and philofophy. At the Reforation he became a member of the Irish Convention; and in the Irish parliament of the year 1661, he was returned as a representative of the county of Carlow, and in 1662 was nominated one of the commissioners from that parliament to the king. At this time he removed with his family to England; and having faithfully executed a fecret commiffion to the bifhop of Munster, with which he was entrusted in 1665, he was appointed in the following year resident at the court of Brussels, and raised by patent to the rank of a baronet. During the reign of Charles II. he was concerned in a variety of negotiations. After the peace of Breda, (July 10, 1667,) fir William went over to Holland, and formed an intimate acquaintance and friendship with De Wit, a man frank and open, and of the same generous and enlarged sentiments with himself; and in consequence of the negotiations of these two able statesmen, a defensive alliance was concluded between Holland and England. Sweden acceded to the confederacy: and thus was

formed the triple league, which was generally regarded with equal surprife and approbation. In the conduct of this business, Temple acquired great honour; but to all the compliments that were paid to him on the occasion, he modestly replied, that to remove things from their centre, or proper clement, required force and labour; but that of themselves they easily returned to it. The French monarch and the court of Spain were equally displeafed; but in the treaty at Aix-la-Chapelle, where Temple appeared as ambaffador extraordinary and mediator, on behalf of England, his adreffs prevailed; the Spanish minifter complied with the conditions propofed; and the peace between the contending powers was figned in May, 1668. In consequence of this event, fir William was nominated ambaffador to the States-General, and taking up his residence at the Hague in the month of Auguft of this year, he maintained his intimacy with De Wit, and was alfo on familiar terms with William, prince of Orange, who had then attained the age of eighteen years. But this triple alliance was of fhort duration. The corruption and intrigues of the English court produced a recall of Temple in the year 1669, and when it was propofed to him to return and make way for a breach with Holland, he declined, much to his honour, engaging in hofility againft a country to which he was attached, and retired from public business to his feat at Sheen, near Richmond. Here he employed himself in the improvement of his mansion, and in the cultivation of his garden; and alfo in writing his "Observations on the United Provinces," and a part of his "Miscellanea." When the war with the Dutch became unpopular through the nation, and the court and its minifters were under a neceffity of bringing it to a termination, fir William Temple was called out of his retirement to negotiate with the Spanish minifter in London: and when the feparate peace with Holland was concluded, he was requested in the next year, 1674, to undertake the office of ambaffador to the States-General, for the purpose of negotiating a general peace. Before his acceptance of this office, he obtained an audience of the king, with a view of ftating to his majesty the pernicious politics of the Cabal ministry, and the neceffity of popular meafures for regaining the confidence of the nation. The negotiations for peace were commenced at Nimeguen, whither he removed from the Hague in 1676: and during their flow progress, he availed himself of the opportunity thus afforded him for accomplishing the popular meafure of the marriage of the prince of Orange to the duke of York's eldeft daughter, which took place in 1677. On another occasion, when the French manifested their intention of retaining the Spanish towns, which were to be furrendered by treaty, Temple was difpatched to the Hague to concert effectual meafures with the States for bringing the French to terms; and in fix days he concluded a treaty, July 1678, by which England was bound to declare war againft the French if the towns were not evacuated within the interval of fixteen days; but fo feeble and fluctuating were the English councils, that before the ratification of the projected treaty, peace was figned at Nimeguen, and France was fecured in the poffeffion of a great part of its conquests.

In 1679 Temple was recalled from the Hague, in order to be appointed one of the fecretaries of ftate; but perceiving the violence of parties, and the prevalence of difcontent, he recommended a council of thirty perfons, which was to be compofed, together with the minifters of the crown, of perfons poffeffing influence and credit in both houfes of parliament. But divisions occurred which prevented the falutary effects of fuch a meafure. Projects of limitation or exclusion were the fubjects of warm difcuffion in parliament.

To these measures Temple was adverse; and his last act in parliament, as member for the university of Cambridge, was to carry from the council the king's final answer to the address of the Commons, never to consent to the exclusion of his brother: other members had previously declined this disagreeable service. When the king, in January 1681, dissolved the parliament without the advice of his privy council, Temple boldly remonstrated against the measure; and at length, wearied with the faction and misgovernment which he had witnessed, he declined the offered return for the university to the new parliament, and retired to Sheen, conveying from thence a message to the king, "that he would pass the rest of his life as good a subject as any in his kingdom, but would never meddle with public affairs." The king replied to the message, that he bore him no resentment; but his name was expunged from the council. The remainder of his life was spent in retirement and seclusion from all public business; and it is said, that he interfered so little in political matters, as not to know the design of the prince of Orange to engage in the expedition that terminated in the revolution, and to be the last person who gave credit to his landing. After James's abdication, however, he waited on the prince at Windsor, and presented to him his son. King William urged upon him the acceptance of the office of secretary of state; but he maintained his purpose of living in retirement. His son was appointed secretary at war; but in the week in which he assumed the office, he was seized with melancholy, and threw himself into the Thames. His reflection on this afflictive event was that which his Stoic philosophy alone could have dictated: "a wife man might dispose of himself, and render his life as short as he pleased." In his state of retirement, he admitted Swift to be his companion, as we have already mentioned under SWIFT's article. King William occasionally visited him, and confidentially consulted him on several important affairs. In 1694 he lost his wife; and sinking gradually under increasing infirmities, occasioned by repeated fits of the gout, his life was terminated at Moor park, in January 1698, in his 70th year. The greatest part of his fortune was bequeathed to the daughters of his unfortunate son by a French lady, under the express condition that they should not marry Frenchmen.

Sir William Temple ranks high as a statesman, and also as a patriot, who well understood and zealously pursued his country's interest. His foibles, without giving them a worse appellation, were impatience with those whom he disliked, warmth in dispute, and a share of vanity and conceit; but he was substantially, says his biographer, a worthy man in the various relations of life. To outward forms of religion he paid little regard; but his letter to the countess of Essex is no less pious than eloquent: so that we can scarcely admit the charge of atheism with which he is reproached by bishop Burnet. As a writer, he ranks among the most eminent and popular of his time. His "Observations upon the United Provinces of the Netherlands" were printed in 1672, and deserve the attention of the politician and philosopher: his "Miscellanea" are lively and entertaining, if not profound. His "Memoirs" elucidate the history of the times. His "Introduction to the History of England" was published in 1695. His "Letters," in 3 vols., which relate to public transactions, were published after his death by Swift. "All sir William Temple's writings," says one of his biographers, "display much acquaintance both with books and men, and are entirely free from the licentiousness so prevalent in that age. Their style is negligent and incorrect, but agreeable, resembling that of easy and polite conversation." Hume's Hist. vol. vii. Svo.

Biog. Brit. Gen. Biog. Account of his Life, &c. prefixed to the folio edition of his Works, in 2 vols. Lond. 1720.

Sir William Temple did not escape the lash of criticism, and such was his vanity or irritability, or perhaps a composition of both, that his indignation was roused, and he expressed himself in the following terms: "The critics are a race of scholars I am very little acquainted with; having always esteemed them but little brokers, who, having no stock of their own, set up and trade with that of other men, buying here and selling there, and commonly abusing both sides, to make out a little paltry gain, either of money or credit, for themselves, and care not at whose cost." In another place he says, "there is, I think, no sort of talent so despicable, as that of such common critics, who can at best pretend to value themselves by discovering the defaults of other men, rather than any worth or merit of their own:—a sort of levellers, that will needs equal the best and richest of the country, not by improving their own estates, but reducing those of their neighbours, and making them appear as mean and wretched as themselves."

TEMPLE, in *Geography*, a town of the province of Maine, in the county of Kennebeck, containing 482 inhabitants.—Also, a township of New Hampshire, in the county of Hillsborough, containing 941 inhabitants; 70 miles W. of Portsmouth.

TEMPLE, *Le*, a town of France, in the department of the Lot and Garonne; 7 miles W. of Villeneuve d'Agen.

TEMPLE Bay, a bay on the N.E. coast of New Holland, to the S. of Cape Grenville.—Also, a bay on the E. coast of Labrador. N. lat. 52° 25'. W. long. 55° 50'.

TEMPLEMORE, (*i. e. the Great Church*), a post-town of the county of Tipperary, Ireland, where there was formerly held a fair for wool, which lasted several days. It is 75 miles S.W. from Dublin.

TEMPLE PATRICK, (*i. e. Patrick's Church*), a post-town of the county of Antrim, Ireland, on the river Six-mile-water; 4½ miles E. by S. from Antrim, on the road to Belfast.

TEMPLERS. See *TEMPLARS*.

TEMPLES, in *Anatomy*. See *TEMPORA*.

TEMPLETON, in *Geography*, a town of America, in the state of Massachusetts, and county of Worcester, containing 1203 inhabitants.

TEMPLETONIA, in *Botany*, is dedicated by Mr. R. Brown, to the honour of John Templeton, esq. of Orange Grove, near Belfast, a gentleman whose enquiries have much enriched our knowledge of Irish plants, and whose name consequently often appears in the pages of the *Flora Britannica* and *English Botany*.—Brown in Ait. Hort. Kew. v. 4. 269.—Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, simple, bell-shaped, with five rather unequal segments in the limb, permanent. *Cor.* papilionaceous, of five petals. Standard elliptical, ascending, entire. Wings nearly the length of the standard, linear-oblong, obtuse, with a small tooth near the base at their upper edge. Keel a little shorter than the wings, oblong, slightly curved, of two half-ovate petals, cohering near the extremity, with short claws. *Stam.* Filaments ten, all combined into one tube for more than half their length, separate above, ascending, five alternate ones rather the shortest; anthers uniform, small, oblong, incumbent. *Pistl.* Germen stalked, linear-awlshaped; style awlshaped, ascending; stigma capitate. *Peric.* Legume stalked, linear-oblong, compressed, obliquely pointed, of one cell and two valves. *Seeds* eight or ten, oval, polished, the scar of each bordered with a prominent crest.

Ess. Ch. *Calyx* simple, with five rather unequal teeth.

Keel

Keel oblong. Stamens all connected. Anthers uniform. Legume stalked, compressed. Seeds numerous, crested.

1. *T. retusa*. Wedge-leaved Templetonia. Ait. n. 1. (*Rafnia retusa*; Venten. Malmaif. t. 53.)—Gathered by Mr. Brown, on the south-west coast of New Holland, from whence seeds were sent to England by Mr. Peter Good, in 1803. This is a greenhouse shrub, flowering in spring and summer. *Stem* about a yard high, with straight, angular, smooth, leafy branches. *Leaves* about an inch and half long, alternate, on short stalks, spreading, entire, emarginate, smooth. *Stipulus* in pairs, small, oval, deciduous. *Flowers* lateral, axillary, solitary, on simple stalks, which are rather shorter than the leaves. *Calyx* destitute of the imbricated appendages which make a principal part of the character of the neighbouring genus *SCOTTIA*. (See that article.) *Petals* near an inch long, of a deep crimson. *Legume* two inches long, and half an inch broad, slightly tumid where each seed is lodged.

TEMPLEUVE *en Pesele*, in *Geography*, a town of France, in the department of the North; 7 miles S.S.E. of Lille.

TEMPLIN, a town of Germany, in the Ucker Mark of Brandenburg, situated between the Bodensee and Dolgensee. In the year 1735, this place was totally consumed by fire, but has been rebuilt to very great advantage; its streets being now broad and straight, and its houses uniform, exclusive of a spacious market-place in it, which forms a regular quadrangle, inasmuch that at present it is one of the most beautiful towns in all the Mark. It carries on a very large trade in timber, which is greatly promoted by means of a canal, newly made. In 1806 it was taken by the French, under the duke of Berg; and the prince of Hohenloe, who had retired hither after the battle of Jena, was made prisoner; 15 miles S.W. of Prenzlau. N. lat. 53° 5'. E. long. 13° 34'.

TEMPLUM SOSTRATI, the name of a kind of surgical bandage described by Galen. He also describes another, under the name of *templum parvum Apollonii Tyrii*.

TEMPO, Ital., time, or measure, in *Musical*.

TEMPO Ordinario, usual time.

TEMPO di Gavotta, gavot time. See GAVOTTA.

TEMPO di Minuetto, minuet time.

A TEMPO, or *à tempo primo*, after a pause, or *rallentando*, or *ad libitum*, implies a return to the first time in which a movement is begun; and in recitative, where, in general, no time is kept, *à tempo*, in an accompanied recitative, implies a regular time.

TEMPOAL, in *Geography*, a town of Mexico, in the province of Guafteca; 50 miles S.E. of St. Yago de los Valles.

TEMPORA, in *Anatomy*, the anterior and lateral parts of the head, where the skull is covered by the temporal muscles: the temples in common language. See CRANIUM.

TEMPORAL, TEMPORALIS, a term frequently used for *secular*. In which sense it stands opposed to *ecclesiastical*.

Pope Boniface wrote to Philip the Fair of France, that he was subject to him, both in spirituals and temporals.

At present, all the doctors on this side the Alps own the supremacy of kings in temporals.

TEMPORAL Action. See ACTION.

TEMPORAL Augment. See AUGMENT.

TEMPORALIS, TEMPORAL, in *Anatomy*, an epithet applied to various parts about the temples; these are a superficial, a middle, and two deep-seated temporal arteries; a temporal bone on each side of the head; a temporal vein;

a temporal muscle; and temporal nerves. See the respective articles.

TEMPORALITIES, or TEMPORALITIES, the temporal revenues of an ecclesiastic; particularly such lands, tennements, or lay-fees, tithes, &c. as have been annexed to bishops' fees by our kings, or other persons of high rank in the kingdom. See REVENUE.

The temporalities of a bishop, &c. stand opposed to his spiritualities. See VACATION.

The canonists on the other side of the Alps, anciently gave the pope a power over the temporalities of kings. Yet pope Clement V. owned frankly, that his predecessor Boniface VIII. had exceeded the just bounds of his authority, in meddling with the temporalities of the king of France. Fevret.

TEMPORALIUM CUSTOS. See CUSTOS and VACATION.

TEMPORALIUM Restitutio. See RESTITUTIONE.

TEMPORARY FORTIFICATION. See FORTIFICATION.

TEMPORARY Hours. See HOUR.

TEMPOREGIATO, in the *Italian Music*, sometimes signifies, that the musicians who accompany the voice, or the person who beats time, should prolong some particular part thereof, to give the actor or singer room to express the passion he is to represent, or to introduce some graces, by way of ornament to the piece.

TEMPOREGIATO is also used in a different sense, for *à tempo*, or *à tempo giusto*.

TEMPORUM OSSA, in *Anatomy*, two bones of the cranium. See CRANIUM.

TEMPSCHE, in *Geography*, a town of France, in the department of the Scheld; 10 miles S.W. of Antwerp.

TEMPTATION, TENTATIO, in *Theology*, an induction or solicitation to evil, whether arising from the world, the flesh, or the devil.

Our Saviour's temptation, previous to the commencement of his public ministry, has been a subject of discussion and controversy among learned divines.

The evangelical account of this transaction may be found in Matt. iv. 1—11. Mark, i. 12, 13. Luke, iv. 1—12. It has generally been supposed, that the evangelical history of our Lord's temptation is to be understood as a narrative of outward transactions: that the devil tempted Christ in person, appeared to him in a visible form, spoke to him with an audible voice, and removed him corporeally from one place to another; and it must be allowed that these suppositions are warranted by the literal interpretation of the history. Nevertheless, this interpretation is liable to a variety of objections. It is unfitable to the sagacity and policy of the evil spirit. Why, it has been suggested, should the devil assault our blessed Lord at all, and what advantage could he expect to gain over him; more especially when he came to him in person, and appeared before him in a visible form, and under his own proper character, proposing and urging temptations which could proceed only from an evil being? In order to evade this difficulty, some writers, as archbishop Secker and Dr. Chandler, have conjectured that the devil appeared *not as himself*, but under the assumed resemblance of a good angel; and others have supposed that he appeared to Christ in the form of a man. But the history furnishes no ground for these conjectures, and they are equally inconsistent with the temptations themselves, considered in their own nature; nor can it be pretended that Christ was ignorant by whom the several temptations, and particularly the third of them, was proposed; for in his reply, he calls him Satan. Besides, this transaction, according to the literal interpretation of its history, was very ill calculated to promote either the honour

## TEMPTATION.

of Christ, or the instruction and consolation of his disciples. This objection is strengthened, when we consider, that Christ must have yielded voluntarily to the mere motion and instigation of the devil, and have been accessory to his own dishonour, danger, and temptation. His character must have been rather degraded than exalted. The temptations presented to Christ were such in their own nature as could not afford evidence or exercise of his obedience, nor of course suitable consolation or useful instruction to his followers, under real and powerful trials. Moreover, it has been objected to the common opinion, that it ascribes to the devil the performance of the greatest miracles, and of things not only preternatural, but absurd and impossible, for such we must regard his shewing Christ all the kingdoms of the world from an exceedingly high mountain, and also whatever constitutes the glory and grandeur of its kingdoms. If we are under a necessity of deviating from a literal, and of adopting a figurative interpretation of the transaction recorded in this history, we are warranted in so doing by other instances of a similar kind, that occur in the sacred writings. These writings relate things as actually done, which nevertheless were only transacted in a vision. Cases of this kind frequently occur in scripture; for which we might refer to Genesis, xxxii. 30. Hosea, i. and iii. Jeremiah, xiii. xxv. xxvii. Ezekiel, iii. iv. v. St. Paul calls his "being caught up into the third heaven" and "into Paradise, a vision and revelation of the Lord." (2 Cor. xii. 1—4.) In conformity to these general principles, some writers of eminence have proceeded in forming their judgment concerning the temptations of Christ; and constrained by such objections as we have already briefly stated, they have abandoned the opinion that these temptations are to be understood as outward transactions, inasmuch as the things themselves were improbable, and even impracticable in their own nature; and inasmuch as the real performance could answer no valuable purpose. Calvin allows, in his note on Matt. iv. 5, that several circumstances in this history agreed best to a vision; and the generality of later writers have admitted, that the devil's shewing to Christ all the kingdoms of the world, and all their glory, in a moment of time, was done by some fictitious scenery, from a persuasion, that it could not be done in any other way. Hence it has been argued by others, that if one of the temptations were presented to Christ in vision only, why might not the *two others* be presented to him in the same manner. Adverting to the history itself, it is alleged, that the text, instead of positively and expressly asserting that the temptation of Christ was a real outward transaction, contains clear intimations, and even direct assertions of the contrary. Thus, in the passage relating to the exhibition of the kingdoms of the world, and all their glory, in one view, and in a single point of view, the evangelist is not speaking of the real sight of all these objects; but he must design to be understood of what was instantaneously exhibited to the mind. Other plain intimations occur, that Christ's temptation is not to be understood as an outward transaction; and it is alleged by the advocates of this opinion, that all the evangelists who have mentioned this affair, do, in express terms, affirm that it passed *spiritually*, and in *vision*, or that it was merely an ideal or mental representation.

Some of those biblical critics, who consider this history as a recital of visionary representations, maintain that these visions were framed by the devil, and that the temptations are to be ascribed to his immediate agency: thus denying the power of Satan over the body of Christ, and granting him a nobler empire, a sovereign influence over the mind. Some have indeed supposed that Christ's temptation was nothing

more than a bare *meditation* of our Lord upon such trials as might possibly be proposed by the great tempter of mankind. But it is needless to make any observations on a view of the subject, which is altogether unsupported by the history.

Another opinion has been proposed by a very able writer, in favour of which he has adduced a variety of arguments, that have given satisfaction to many persons who have examined this subject. Mr. Farmer (in his Inquiry into the Nature and Design of Christ's Temptation in the Wilderness) represents our Lord's temptation as befalling him while he was under a prophetic vision, of which the Spirit of God himself was the immediate and sole author. Accordingly he considers the temptation of Christ, neither as an outward transaction, nor diabolical delusion, but as a divine vision. At the time when this event occurred, our Saviour was actually in the wilderness, and therefore when the evangelist says, that "Jesus was led up of the Spirit into the wilderness," or as our author more literally renders the words, "then was Jesus brought (or carried) into the wilderness by the Spirit," he intimates, that into a wilderness our Lord seemed to himself to be carried, or thither he was transported in vision by a prophetic divine afflatus. The expressions used by the other evangelists, Mark and Luke, are said to confirm the explication thus given of the language of St. Matthew. Upon the whole, the meaning of the evangelists will be, "Christ was brought into a wilderness (not merely under a divine direction, but) under the full influence of the prophetic Spirit, making suitable revelations to his mind, and giving him a view particularly of his future trials." And these trials are described as "temptations of the devil," on account of the particular mode of their being revealed, being couched under the figure of Satan coming to him, and urging temptations. Our author, proceeding to examine the proper intention of this prophetic vision, observes, that the several scenes which it comprehends, though presented to Christ in the form, and capable of answering the end, of a present trial, were directly intended as a symbolical prediction and representation of the future difficulties of his office and ministry. The first scene in Christ's vision was probationary, serving to discover the present turn and temper of his mind; and also prophetic, having a reference to his future ministry, through the whole course of which he was pressed with the same kind of temptations, and resisted them upon the same principles. This part of the vision, therefore, conveyed this general instruction: "that Christ, though the son of God, was to struggle with the afflicting hardships of hunger and thirst, and all the other evils of humanity, like the lowest of the sons of men; and that he was never to exert his divine power for his own personal relief, under the most pressing difficulties, or for the supply of his most urgent occasions; but with resignation and faith to wait for the interposition of God in his favour." The second scene of this vision was Jerusalem, the metropolis of Judea and the seat of power; it was the temple of Jerusalem, where the Jews expected the first appearance of their Messiah; it was the wing of the temple, the eastern front of it, which commanded a view of the worshippers below. From this eminence Christ is required to throw himself down, in a dependence upon the divine protection, that so his miraculous preservation might give evidence of his divine mission, and induce the numerous worshippers, who were eye-witnesses of it, to acknowledge him immediately as the Messiah, visibly descending from heaven, in a manner agreeable to the expectation of the Jews. Such was the proposal, and the temptation was powerful. The principle upon which he rejected it was, in its spirit and meaning, this: "the Scripture forbids us

to prescribe to God in what instances he shall exert his power; and as we are not to rush upon danger without a call, in expectation of an extraordinary deliverance; so neither are we to dictate to divine wisdom what miracles shall be wrought for men's conviction." As this trial bore reference to his future ministry, we find that in exemplifying the principle now manifested, he never needlessly and unwarrantably exposed himself to danger, and then relied on a miraculous interposition of divine power for his rescue; but he was cautious in declining hazards; avoiding what might exasperate his enemies; and even enjoining silence with regard to his miracles, when the publication of them was likely to excite envy or popular commotion, and to inflame their minds against him. In displaying the evidences of his divine mission, he still acted upon the same maxim, opening his commission, not at Jerusalem, but in Galilee. In order to avoid ostentation and offence, he kept himself as private as the object of his commission would allow; and instead of courting the favour of the opulent and powerful, he conversed freely with all sorts of people. In many other instances which an attentive perusal of his history will furnish, his ministry will correspond to his prophetic vision, in which he was tempted to a public and ostentatious display of his miraculous powers. In the third scene, the proposal was instantaneously rejected, and not without a mixture of just indignation. Besides this trial of his temper, the scene before us pre-signified the temptation to which he would be exposed in the course of his future ministry, during which he was called upon to prostitute himself, with all his miraculous endowments, to the service of Satan, for the sake of worldly honours, or for gratifying the mistaken expectations of the Jewish people. For a farther illustration of this subject, we must refer to the work already cited. See also archbishop Secker's, Dr. Clarke's, Dr. Chandler's, Mr. Mason's Sermons, on this subject. Beunson's History of the Life of Christ. Macknight's Truth of the Gospel History.

TEMPTATION, *Tentatio*, in our *Ancient Law-books*, is used for a trial, proof, or assay. "Tentatio panis fiat bis in anno." Chart. Edw. I. See ASSAY, &c.

TEMROOK, in *Geography*, a famous station in the Crimea, situated at the foot of a small mountain, near the northern embouchure of the Kuban. It is now a single hut, for the purpose of supplying post-horses. In Motraye's time, who travelled this way in December 1711, it was a place of greater importance. He describes it as considerable for its commerce in hides, caviare, honey, Circassian slaves, and horses. He supposed that its castle stood where the ancients placed their "Petraus;" and two eminences, he says, which are named "the point of the island," may have been their "Achilleum Promontorium." This, it is supposed, was the situation of Cimmerium. Pallas conjectures, that Temrook may probably have been the "Cimbricus" of Strabo.

TEMS, Fr., *time*, in *Musical*; as *à contre tems*, against time.

TEMSENA, in *Geography*, a province of Morocco, situated on the coast of the Atlantic, to the S. of Sallee. This province is rich and fertile, and abounds in excellent provisions, of various kinds. Its name seems intended to signify its salubrity, and the purity of the climate. Temsena appears to be derived from the two Arabic words *Tamam Sana*, *only a year*; as if they should say, that to reside here only a year would be sufficient to insure the sickly the return of their health, and such, in fact, is the firm belief of the natives. Corn is very plentiful in this province; it is of a very excellent kind, and the ears frequently bear 70 grains, or more. In the forests is found a kind of cedar, called *bazar*, of a

resinous smell; it is a hard and incorruptible wood, and the Moors employ it in building their houses.

This and the neighbouring provinces abound in horses and horned cattle; their flocks are numerous, and the cavalry of Temsena is the best appointed of the empire, excepting the Black troops of the emperor, called Abeed Seedy Buharrie. The population of the districts of Temsena and Shawia is estimated at 1,160,000 persons. The males of Temsena and Shawia are a strong, robust race, of a copper colour; their women possess much beauty, and have highly expressive features; and the animation of the countenance is increased by the use of *el kokol* filelly, with which they tinge their eye-lashes and eye-brows. In these provinces they are fond of dyeing their hands and feet with a preparation of the herb henna, which gives them a beautiful orange-colour, and, in hot weather, imparts a pleasing coolness and softness to the hands, by preventing, in a considerable degree, the quickness of perspiration.

TEMUS, in *Botany*, a genus which Justieu has condescended to adopt, by its barbarous name, from the hardly less barbarous information of Molina. *Juss. Gen.* 435.—Class and order, *Polyandria Digynia*. *Nat. Ord.* uncertain.

Ess. Ch. "Calyx three-cleft. Petals eighteen, linear, very long. Stamens twenty-six, shorter than the petals. Anthers globose. Germens two. Styles two. Berry two-lobed. Seeds tunicated."—Native of Chili, where it is called *Temo*. This it seems is an evergreen tree, with alternate leaves, and stalked terminal flowers.

TEMUS, in *Geography*, a river of Sardinia, which runs into the sea, 4 miles E. of Castello Arragonefe.

TENA, a town of South America, in the province of Quito; 15 miles S. of Archidona.

TENABLE, formed from the French *tenir*, and that from the Latin *tenere*, to hold, in the *Military Art*, something that may be defended, kept, and held, against assailants.

Tenable is little used, but with a negative: when a place is open on all sides, and its defences are all beaten down, it is no longer tenable. When the enemy has gained such an eminence, this post is not tenable.

TENACIOUS BODIES. See TENACITY.

TENACITY, in *Natural Philosophy*, that quality of bodies by which they sustain a considerable pressure, or force, without breaking. *Mem. Acad. Berlin*, 1745, p. 47.

Tenacity is the opposite quality to fragility, or brittleness.

TENACULUM, in *Surgery*, an instrument used in amputation, for pulling out bleeding vessels that are to be tied by ligatures.

TENAGLIA, in *Biography*, a Roman composer, mentioned by Pietro della Valle, as having set the opera of "Clearco," for that city, about 1634. This seems to have been one of the first musical dramas performed at Rome in a public theatre.

TENAILLE, in *Fortification*, a kind of outwork, consisting of two parallel sides, with a front, in which is a re-entering angle.

In strictness, that angle, and the faces which compose it, are the tenaille.

The tenaille is of two kinds; *simple* and *double*.

TENAILLE, *Simple*, or *Single*, is a large outwork, consisting of two faces or sides, including a re-entering angle. See *Plate V. Fortification*, *fig. 4. lit. d.*

TENAILLE, *Double*, or *Flanked*, is a large outwork, consisting of two simple tenailles, or three salients, and two re-entering angles. *Fig. 21. lit. e.*

The great defects of tenailles are, that they take up too much

much room, and on that account are advantageous to the enemy; that the re-entering angle is undefended; the height of the parapet hindering the seeing down into it, so that the enemy can lodge there under covert; and the sides are not sufficiently flanked.

For these reasons, tenailles are now excluded out of fortifications by the best engineers, and never made, but where there wants time to form a horn-work.

*TENAILE of the Place*, is the front of the place, comprehended between the points of two neighbouring bastions; including the curtain, the two flanks raised on the curtain, and the two sides of the bastions which face one another.

So that the tenaille, in this sense, is the same with what is otherwise called the *face of a fortress*.

*TENAILE of the Ditch*, is a low work raised before the curtain, in the middle of the foss or ditch; the parapet of which is only two or three feet higher than the level ground of the ravelin.

There are three different forts (*Plate VII. Fortification, fig. 6.*) The first are those which are made in the direction of the lines of defence, leaving a passage of three toises between their extremities and the flanks of the bastions, and likewise another of two toises in the middle for a bridge of communication to the ravelin. The second (*fig. 7.*) are those whose faces are in the lines of defence, and sixteen toises long, besides the passage of three toises between them and the flanks of the bastions: their flanks are found by describing arcs from one shoulder of the tenaille as a centre through the other, on which are set off ten toises for the required flanks. The third fort (*fig. 8.*) comprehends those whose faces are sixteen toises, as in the second fort, and the flanks parallel to those of the bastions.

The use of tenailles, in general, is to defend the bottom of the ditch by a grazing fire, and likewise the level ground of the ravelin, and especially the ditch before the redoubt within the ravelin, which cannot be so conveniently defended from any other place. The first fort do not defend the ditch so well as the others, because they are too oblique a defence; but as they are not subject to be enfiladed, M. Vauban has generally preferred them in the fortifying of places. Those of the second fort defend the ditch much better than the first, and add a low flank to those of the bastions; but as these flanks are liable to be enfiladed, they have not been much used. This defect, however, might be remedied, by making them so as to be covered by the extremities of the parapets of the opposite ravelins, or by some other work. Those of the third fort have the same advantage with the second, and are subject to the same inconveniences; and, therefore, they may be used with the same precaution.

Tenailles are esteemed so necessary, that there is hardly any place fortified without them, and it is not without reason; for when the ditch is dry, the part behind the tenailles serves as a place of arms, from which the troops may sally, destroy the works of the enemy in the ditch, oppose their descent, and retire with safety; and the communication from the body of the place to the ravelin becomes easy and secure, which is a great advantage; for by that means the ravelin may make a much better defence, as it can be supplied with troops and necessaries at any time. And if the ditch is wet, they serve as harbours for boats, which may carry out armed men to oppose the passage over the ditch whenever they please; and the communication from the tenailles to the ravelin becomes likewise much easier than it would be without them. Muller's Elem. of Fort. p. 34. See FORTIFICATION.

The ram's-horn is a curved tenaille, raised in the foss before

the flanks, and presenting its convexity to the covered way. This work seems preferable to either of the other tenailles, both on account of its simplicity, and the defence for which it is constructed.

*TENAILLONS*, are works constructed on each side of the ravelin, much like the lunettes: they differ, as one of the faces of a tenaillon is in the direction of the ravelin, whereas that of the lunette is perpendicular to it.

Tenaillons are constructed by producing the faces of the ravelin beyond the counterscarp of the ditch, at a distance MN (*Plate VII. Fortification, fig. 9.*) of thirty toises, and taking on the counterscarp of the great ditch fifteen toises from the re-entering angle  $p$  to  $q$ , and drawing  $Nq$ ; then  $qNMp$  will be the tenaillon required; its ditch is twelve toises, or the same as that of the ravelin. Sometimes there is made a retired battery, in the front of the tenaillons, as at B: this battery is ten toises from the front, to which it is parallel, and fifteen toises long. There are commonly intrenchments made in the tenaillons, such as O; their parapets are parallel to the fronts MN, or rather perpendicular to the side  $Nq$ , and bisect the side  $qN$ ; the ditch before this retrenchment is three toises, and there is a banquet before the parapet, next to the ditch, of about eight feet, called *berm*, serving to prevent the earth of the parapet (which seldom has any revetement) from falling into the ditch. The ravelin, before which tenaillons are constructed, must have its salient angle much greater than the former construction makes them; otherwise the salient angles of the tenaillons become too acute; for which reason the capital of this ravelin is made forty-five toises, and the faces terminate within three toises of the shoulders. Muller's Elem. Fort. p. 37.

A tenaillon is a work capable of affording great defence to the besiegers; as at the siege of Lille, in 1708, where the besiegers were twice or thrice drove out of a tenaillon they had taken and retaken.

*TENALA*, in *Geography*, a town of Sweden, in the province of Nyland; 8 miles N.W. of Eknas.

*TENANCY*, a habitation, or house to live in, or a tenement or possession held of another.

*TENANCY, Entire.* See ENTIRE.

*TENANCY in Tail.* See FEE-Tail.

*TENANT*, in *Agriculture*, a person holding land or other property of another, either by grant, lease, or otherwise. Tenants are of different kinds, according to the nature of the tenures by which they hold their lands; but, in this last respect, they properly belong to the business of the law. Tenants hold their lands or farms for very different lengths of time, in different districts, as from one year to twenty-one; but in many places they have no leases at all. The most common lengths of time are seven, nine, fourteen, nineteen, and twenty-one. Short leases are now becoming general, as those of seven, nine, and eleven years. Tenants now mostly pay all taxes, except that on property.

The proper choice of tenants is a matter of the greatest importance to the well-doing and continued prosperity and success of all sorts of landed property, of almost any that can be adopted; as where they are improperly provided, there can hardly any thing go on in the manner which it ought to do; nor can there be the best sort of management, that the case will admit of, pursued. Many things will necessarily run into complete neglect, and ruinous states of them be produced as the consequence, which might have been easily and wholly avoided, by more attention in the first selection of the tenants.

The writer of the Middlesex Agricultural Report, after inculcating the necessity and utility of tenants having good

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and properly regulated leases of the lands which they hold, remarks, that the letting of farms to tenants at will, or from year to year, is a most unwise practice, and one which should by all means be avoided by the proprietors of landed estates; as such tenants, he contends, from the very nature of their tenures, are precluded from the possibility of making any improvements; while they have it in their power to ruin the lands they occupy and hold. Rapacious landlords, unskilful stewards, and yearly tenancy, it is continued, destroy the holders' or tenants' confidence, smother their thoughts of improvements, and, in short, make bad tenants, by setting them to contrive some mode of occupying the lands, so as to be able to quit them, on receiving half a year's notice, with the least possible loss to themselves; and which can only be done, by keeping the soil continually in a poor state, to the evident great losses of the proprietors, the no less ones of the tenants, and the still more disadvantages of the community in general. See LEASE, LETTING of Farms, and QUALIFICATIONS of Tenants.

The writer of the work on "Landed Property" has remarked that, on all large estates, there are certain established customs and usages to which the proprietors, as well as the tenants or occupiers, consider themselves mutually amenable, although no legal contracts may subsist between them; and that, even where imperfect leases, or other legal agreements, exist, there is still, in general, much left for custom and usage to determine. These fixed regulations, though they may be imperfect, it is contended, should be strictly regarded by superintendents, until better ones are substituted in their place, not only for the sake of moral justice, but as setting an example of integrity and good faith to the tenants. Nothing of this sort should ever be broken through by those in the management of such properties; as tenants on all such are constantly to be met with ready enough to break their stipulated agreements, without such examples; and it must be extreme folly to induce the others who are well disposed to do the same. On the contrary, it is but common prudence to fulfil every covenant, agreement, and promise, which may have been made, with the most scrupulous exactness, even to the meanest cottager, in order to inspire proper confidence, and obviate much mischief.

And besides setting examples of these kinds before the tenants, they ought, it is supposed, to be liberalized in their minds, by good offices, and acts of kindness, which may be beneficial in various ways. A spirited improving tenant should be refused few reasonable demands: he should have advantages conferred on him, not merely as rewards for his labours in benefiting the lands, but as inducing other tenants to pursue similar plans, and to shew that good managers are noticed and distinguished.

The consequences of an inattention to these matters, which is too common in most parts of the country, are very prejudicial; as the refusing of requests which would equally benefit the estate and the tenant, the stupidly thwarting of the well-meant intentions of the best tenants upon it, the ignorantly quarrelling with them about mere trifles, and the making no sort of difference between those who are improving and those who are ruining it, or perhaps the encouraging the latter, and opposing the former, must have effects of the worst kind, there can be no doubt. Such tenants as are capable of improving, are also capable of impoverishing; and when disgusted by improper treatment, will be sure to harass the lands they hold, and take the first chance they have of removing to farms under more rational management, to the great inconvenience and disadvantage of those which they held before.

It is observed in the Agricultural Survey of Gloucester-

shire, that the leases of rack-renters there generally commence at Lady-day; and, in this case, in the vale, the going-off tenant holds a part of the grafs-lands to old May-day, and has likewise the going-off crop of wheat, with the use of the barns for the purpose of housing and threshing it, till the Midsummer following. In this usage there is, the writer thinks, great inconvenience, especially where the new tenant is at variance with the old one, which is not uncommonly the case. Each has an opportunity of distressing and incommoding the other in various ways. The improved spirit of agriculture has discovered, both to landlord and tenant, the absurdity of this ancient custom; and it is gradually falling into disuse. Where an improvement has taken place, the coming-on tenant enters the preceding Michaelmas to plough the land for spring-crops; the tenant going off at Lady-day ploughs for the wheat-crop, and often sows it. In the case of ploughing only, the work is paid for; and when sowed, the crop is valued at Lady-day, and paid by the coming-on tenant. The going-off tenant is also frequently paid for his seeds left after the last year's crop. Under this practice, the new tenant enters on the whole of the estate at Lady-day. And it is added, that Michaelmas takings are not uncommon; though, in one respect, they are particularly inconvenient, as the old tenant has no time to spend the crops of the preceding summer on the premises, and the new tenant is either obliged to sell his stock at a most unfavourable time, or purchase fodder for the support of it at his new farm; a circumstance he cannot always command, and, when he can, at great loss. But there are other takings which commence at Candlemas, which have some inconveniences, particularly that of enabling the new tenant to "hain up" his pastures early, which is a matter of considerable consequence; for the old tenant, going off at Lady-day, always stocks as far as he can till the last moment, thereby leaving the ground as bare as possible. Nor is the mischief of this late *haining* always compensated by the manure left from the cattle, especially if the season has been wet, and the ground tender. Two years' care will sometimes scarcely recover the land to a good and even turf, after having been much trodden or *poached*.

But with respect to agreements between landlord and tenants, it has been suggested by some, that for small farms, leases are less necessary; but a large one cannot well be let without a lease. Upon a small farm, whose land is good, a man's improvements soon come round; and if the tenant or landlord disagree, either of them is easily accommodated; but upon a large farm it is quite otherwise. It would not be worth a man's while to fix himself upon a large scale for a year or two; and it would be attended with great expence and loss, to move from any great distance, with large quantities of stock, for a short time. Besides, the plans of improvements upon a large farm are more extensive; and it is longer before the money laid out in them is returned, especially upon poor land. But undoubtedly the tenant, upon either a small or a large farm, ought to have a security for his property; and there should be an agreement to allow him a proportionate recompence for every improvement by which he has raised the land in its value, as by giving it more manure than could be made from the produce of the farm. When the manure produced upon the farm is the property of the farmer, and, by the terms of his lease, he is obliged to sell it to the coming tenant at a fair valuation, he often endeavours to make more manure the last year than any other, and by that means benefits the estate; but if, on the contrary, he is not paid any thing for it, he will perhaps do every thing in his power to prevent any future improvement upon the farm, as, on some account or another, he may fancy himself

himself ill used upon leaving it. For all under-draining properly done, and for new buildings that were necessary for the farm, the tenant ought to be allowed a reward proportionate to the number of years less than twenty he may have had the use of them. He should likewise receive an allowance for quick fences, and the planting of orchards, or of aquatics and other useful trees in proper places, on producing fair bills, with receipts to them, of the expences; provided he leaves the estate without committing any wilful waste. The landlord who enters into such a covenant with his tenant, may reasonably expect to have his farm delivered back to him upon terms equally fair. If the tenant has committed any waste, he should be obliged to make good all damages. Now such mutual conditions would do away many absurd restrictions that are at present laid upon the tenant; as it would then be his interest not to injure the farm, because he must pay for all damages wantonly done; and the landlord would have no reason to check the farmer's experiments and improvements, which would be a great encouragement to both ingenuity and industry: for gentlemen's agents are very apt, from too anxious care of the estates, to restrict tenants in such a manner, that they are little better than a mill-horse, who can go over only a particular circle of ground. It has been known that an agreement was made to lay a certain quantity of lime on land, where, if the land had been the writer's, he would have given more money than the lime cost, that it might not be laid on.

And sometimes, besides many other injurious modes of culture, which the ignorance or whim of the steward obliges the farmer to follow, he is tied down to plough and low crops of corn only four years in six, and no turnips or clover. But the restricting a man from ploughing up grass-land without leave, is certainly, it is thought, proper, till the landlord sees what his new tenant makes of the land he does plough; but if he is industrious, and tills well, the writer would suffer him to plough every inch he chose: as, on good arable land, it will certainly make in future a difference of from one pound to three pounds an acre in rent to the landlord. The nature and situation of the farm are, however, to be well considered before this is done.

Also where the duration of the term is twenty-one years, it would, it is supposed, be very proper that, three years before the lease expires, he should be restricted in the rotation of his crops, so as to leave the farm in a proper state to be profitable to the coming tenant. This would likewise give time for the tenant to fix himself elsewhere, if the landlord and he do not agree again, as well as for the landlord to make proper choice of a new tenant.

It is very common for tenants to live in a very poor way, and obtain little profit, from the want of introducing a proper system of husbandry upon their farms, as it is only this that can afford a full profit; therefore, the best methods of management his circumstances will afford should always be pursued.

There is a great variety of regulations and restrictions in regard to tenants, in respect to the times and manner of entering upon their farms, the extent and methods of breaking up and cropping the lands, the various improvements in draining, manuring, &c. the making of fences, the selling of hay and straw, the disposing of the live-stock at the end of leases, the occupying of buildings by new tenants, the felling of timber for repairs, and a vast number of other matters, many of which are owing to the particular situations and circumstances of the lands that are to be holden by the tenants.

TENANT, or *Tenant*, *Tenens*, in *Law*, one that holds or

possesses lands and tenements of some lord or landlord, by any kind of right, either in fee, for life, years, or at will.

The term *tenant* is used with divers additions. Thus, *tenant in dower*, is she that possesses lands by virtue of her dower.

*Tenant per Statute-Merchant*, he that holds lands forfeited to him by virtue of a statute. See *STATUTE-MERCHANT*.

*Tenant in Frank-Marriage*, is he that holds lands or tenements by virtue of a gift of them, made to him upon marriage, between him and his wife. See *FRANK-MARRIAGE*.

*Tenant by Courtesy* holds for his life, by reason of a child begotten by him of his wife, being an inheritrix, and born alive. See *COURTESY*.

*Tenant by Elegit* holds by virtue of the writ called an *elegit*.

*Tenant in Mortgage* holds by means of a mortgage.

*Tenant by Verge*, in ancient demesne, is he who is admitted by the rod in court to lands in ancient demesne. See *VERGE*.

*Tenant by Copy of Court-Roll*, is one admitted tenant of any lands, &c. within a manor, which, time out of mind, have been demised according to the custom of the manor. See *COPYHOLD*.

*Tenant Paravail*. See *PARAVAIL*.

*Tenant by Charter* is he that holdeth by feoffment in writing, or other deed. See *CHARTER*, and *FEEHOLD*.

*Tenant in Capite*, or *Chief*, holdeth of the king in right of his crown. See *CAPITE*.

*Tenant of the King* is he that holdeth of the person of the king.

TENANTS, *Joint*, those who have equal right in lands or tenements, by virtue of one title. See *JOINT TENANTS*.

TENANTS in *Common*, those who have equal right, but hold by divers titles.

TENANT, *Particular*, he that holds only for his term.

TENANT, *Sole*, is he who has no other joined with him.

TENANT by *Execution*, is he who holds by virtue of an execution upon any statute, recognizance, &c.

TENANTS, *Customary*. See *CUSTOMARY*.

TENANT, *Terre*. See *TERRE-TENANT*.

TENANT, *Very*. See *VERY*.

Anciently, there were also *tenant by knight-service*, *tenant in burgage*, *tenant in socage*, *tenant in frank-fee*, *tenant in villenage*. And there are still *tenant in fee-simple*, *tenant in fee-tail*, *tenant upon sufferance*, &c.

TENANT in *Tail after Possibility of Issue extinct*. See *TAIL*.

TENANT to the *Præcipe*, in *Law*, is he against whom the writ of *præcipe* is to be brought in suing out a recovery.

TENANT, or *Tenan*, in *Heraldry*, is used for something that sustains, or holds up, the shield, or armoury; and is generally synonymous with the word *supporter*.

The difference which some authors make between the two is, that tenants are single, and supporters double, one placed on each side of the shield. But the proper distinction seems to consist in this, that tenants are human figures, and supporters figures of beasts.

There are various forms of tenants, as well as of supporters, viz. angels, maids, religious, savages, Moors, &c.

The first tenants, F. Menestrier observes, were trunks, or branches of trees; to which the escutcheons were fastened by straps and buckles. Afterwards the knights were represented as holding their own escutcheons, which were either hung to their neck, or else they leaned on them.

The origin of tenants and supporters is, by many, referred to the ancient tournaments, in which the cavaliers had their arms borne by servants disguised like savages, Moors, fabulous deities, bears, lions, &c. See *SUPPORTER*.

TENA.

TENARIUM, in *Ancient Geography*. See TĒNARIUM.

TĒNARUS, or TĒNARUS, a mountain of the Peloponnesus, in Laconia.

TENASSERIM, in *Geography*. See SIAM.

TENATARI, in *Ancient Geography*, a people who inhabited that part of Germany which corresponds to the present bishopric of Munster.

TENBURY, in *Geography*, a market-town in the upper division of the hundred of Doddington, and county of Worcester, England, is situated on the western border of the county, separated from Shropshire by the river Teme, at the distance of 21 miles N.W. by W. from Worcester, and 134 miles in the same bearing from London. The manor of Tenbury, at, or soon after the Conquest, was held by Robert Fitz-Richard, who was lord of Richard's castle; his heir assumed the name of Say, in consequence of a marriage with the heiress of that family: the property past, by a succession of heiresses, through various families, to the Cornwalls, whose descendants are still the lords of it. The town is not very extensive, and standing low, is often subject to floods from the rapid river Teme. A remarkable instance occurred Nov. 17, 1770, when a great part of the church, with its organ and monuments, were destroyed. The parish of Tenbury is three miles and a half in length, by three and a quarter in breadth; and in the year 1811 contained 308 houses, and 1562 inhabitants. In the chancel of the church is a curious monument, representing a child in armour, laid in a cross-legged position. Gough, in his *Sepulchral Monuments*, mentions this figure, and attributes it to the son of "John Sturmy, the crusader, who followed his father to the holy wars when under age."

Over the river, at the north end of the town, is a handsome stone bridge of six arches. A market is held here on Tuesdays, and there are three annual fairs. Great quantities of hops and apples are cultivated in the vicinity of the town, and consequently much cyder is made here. The Leominster canal, coming near the town, affords ready communication for goods, cyder, &c. to distant places.

About one mile and a half S.E. of Tenbury is Suttonpark, in the chapel of which are some old monuments of the Arundel family. Near this place is Kyre-Wyre, distinguished for its "tall and mighty oaks," and for a neat mansion belonging to the Pytts family.—*Nash's History, &c. of Worcestershire*, 2 vols. folio. *Beauties of England and Wales*; *Worcestershire*.

TENBY, a market and borough town in the hundred of Narbeth, and county of Pembroke, South Wales, is situated on the shore of Caermarthen bay, 10 miles E. from Pembroke, and 250 miles W. from London. It occupies a rocky promontory of considerable elevation, stretching over the sands in a southerly direction, and at high water is nearly inclosed by the sea. Here is a small but commodious harbour, skirted on the land-side by a bold amphitheatre of rocks and houses. Leland says, "Timbigh town stonidith on a main rokke, but not veri hi, and the Severn Se so gulfeth in about hit, that at the ful se almost the thirde part of the town is inclosed with water." The toune is strongeli waullid and welle gatid, everi gate having his portcolis ex solido ferro. But that gate that ledith to Cairmarden ward is most femelieit, as circulid without with an embatelid but open roid towr, after the falcion of the east gate of Pembroke. Without this gate is a preti suburbe. In the middes of the town is a faire parochie chirch. The town itself lakkith fresch water, wherfore utuntur importata." And again, "Ther is a finus and a peere made for shyppes. The towne is very welthe by marchaundyce; but yt is not very bygge, having but one parochie chyrehe. One thing is

to be marveled at. There is no welle yn the towne, as yt is faide, wherby they be forced to fech theyr water at S. John's without the towne." The wall, which once surrounded the town, is yet in some places nearly entire. The principal improvement of these walls is ascribed to queen Elizabeth, in whose time Tenby was a flourishing place. The streets are now in general good, though, on account of the nature of the ground, in some instances inconveniently narrow and steep. They contain a large proportion of very respectable houses, occupied by substantial tradesmen and merchants, or by persons of independent fortunes. The want of water was an inconvenience under which the town long laboured: but by the recommendation and exertions of sir William Paxton, the town is now furnished, at a trifling charge, with an exhaustless supply of this necessary article. Tenby is one of the contributory boroughs joined with Pembroke in the return of a representative to parliament. The corporation consists of a mayor, aldermen, and common-councilmen, a chamberlain, town-clerk, two sheriffs or bailiffs, two sergeants at mace, and twelve constables. The town is divided into two districts, which are denominated the In-liberties, and the Out-liberties. The former division is subject to the jurisdiction of the magistrates of the borough; the latter to that of the county magistrates. The present extent of the town is not considerable, the number of houses being estimated, in the year 1811, at 265, and the population at 1176. It is apparent, however, from the number of ruined buildings and foundations to be seen in the outskirts, that formerly it must have spread over a larger space than it now occupies, and contained a much more numerous population. Two weekly markets are held on Wednesday and Saturday, and five fairs annually. Tenby seems to have derived its earliest importance from its fisheries. But when the country fell under the power of the Anglo-Norman invaders, and this district became inhabited by the Flemish settlers, its local advantages for commercial objects of greater consequence were seen and appreciated. The harbour was improved for the convenience of shipping, and the population of the town and its vicinity was engaged in a woollen manufactory on an extensive scale. The commercial spirit thus awakened, procured for the inhabitants numerous privileges and charters from their lords, and from successive monarchs. The importance of Tenby, however, has sunk far below its former rank: its manufactories have disappeared, and its chief trade at present is created by the coal raised in its neighbourhood, which is here shipped off for other parts of the coast, and for the English markets. The consequence which the town has lost in this respect seems likely to be compensated by its rapidly advancing reputation as a bathing-place. It possesses many natural attractions for visitors; and peculiar advantages in point of convenience have been recently provided. Among these, the foremost rank must be assigned to the baths lately erected by sir William Paxton; in which all accommodations for health and pleasure are combined. The church of Tenby is situated in the middle of the town; it is a spacious edifice, comprising a nave and two side aisles: at the west end is a large square tower, surmounted by a lofty spire: The monastic establishments of Tenby were an hospital, or free chapel of St. John the Baptist, a convent of Carmelite friars, founded in 1399, and called St. Mary's college, and an hospital or lazaret-house, dedicated to St. Mary Magdalen. Here was an ancient castle, of which there are yet considerable remains, though mostly in a very dilapidated state. The only portions now standing that indicate its former strength are a bastion and square tower: the rest of the buildings exhibit the air of a splendid mansion rather than

of a military fortrefs. The fttuation of this caſtle was admirably formed for defence: it occupied the extreme point of the promontory, and was ſecured by inacceſſible rocks on every ſide, except that facing the town, which was ſtrengthened by bold fortifications.

On the coaſt at Tenby are ſome inflated rocks of romantic appearance, which exhibit curious excavations. Some of them are acceſſible on foot at low water: this is the caſe with the iſland of St. Catherine, off the Caſtle Point, which in one direction has been perforated quite through by the repeated action of the tides. The principal of theſe iſlands is *Caldy*, ſituated about two miles from the main land. It is about a mile in length, and half a mile wide, and is eſtimated to compriſe about ſix hundred acres of ſurface, of which nearly a third is in cultivation. Here was a priory, founded, as is ſuppoſed, by Robert, the ſon of Martin de Turribus. The tower of the priory church, ſurmounted by a ſtone ſpire, is yet ſtanding, and many of the conventual buildings have been converted into offices, and attached to a handſome modern edifice.

Near the coaſt, to the eaſtward of Tenby, are ſeveral reſpectable gentlemen's reſidences, ſome of them of ancient date. Among theſe are Cilgetty, formerly inhabited by the Canon family; Hen-Caſtell, (the old caſtle,) the property of Thomas Stokes, eſq.; Merrixon, the ſeat of Charles Swan, eſq.; Bonville Court, an ancient manſion of the Bonvilles; and Eare Wear, now called Amroth Caſtle, the reſidence of captain Ackland; and on the road from Narbeth is Begely Hall, the ſeat of James Child, eſq.—*Beauties of England and Wales*, vol. xviii. Pembrokeſhire, by T. Rees. *Hiſtorical Tour through Pembrokeſhire*, 4to. 1810, by R. Fenton, eſq. *Account of Tenby*, illuſtrated with etchings, 4to. 1812, by Charles Norris, eſq.

TENCE, a town of France, in the department of the Upper Loire; 12 miles S.E. of Moniſtrol.

TENCH, in *Ichthyology*, the Engliſh name of the *tinea* of the modern authors, the *fullo* and *gnapheus* of the ancients.

It is, according to the Artedian and Linnæan ſyſtem, a ſpecies of the cyprinus, and is diſtinguiſhed by Artedi by the name of the blackiſh, mucous, or ſlimy cyprinus (which ſee), with the end of the tail even. See *Tench* FISHING.

TENCH's *Iſland*, in *Geography*, an iſland in the Pacific ocean, ſo called by Lieut. Ball, commander of the Supply, returning from Norfolk iſland to England in the year 1790. The iſland cannot be more than two miles in circumference: it is low, but entirely covered with trees, many of which are the cocoa-nut; there were likewiſe others of a large ſize. Theſe trees reached to the margin of a very fine ſandy beach, which entirely ſurrounds the iſland. A great number of canoes were lying on the beach; and, it is ſuppoſed, there cannot be leſs than a thouſand inhabitants on the iſland. The natives who were in the canoes were ſtout and healthy-looking men; their ſkin was perfectly ſmooth, and free from any diſorder: they were quite naked, and of a copper colour; their hair reſembled that of the New Hollanders. Some of their beards reached as low as the navel, and there was an appearance of much art being uſed in forming them into long ringlets: ſo that it ſhould ſeem as if the prevailing faſhion on this iſland was that of keeping the beard well combed, curled, and oiled. Two or three of the men had ſomething like a head or bone ſuſpended to a ſtring, which was faſtened round the neck. S. lat. 1° 39'. E. long. 150° 31'.

TENCOA, a town of Mexico, in the province of Honduras; 110 miles W. of Comayagua. N. lat. 14° 48'. W. long. 90° 22'.

TENCZA, a town of Auſtrian Poland; 13 miles W. of Cracow.

TEND, in our *Old Writers*, ſeems to ſignify as much as tender, or offer; as to tend or traſverſe an averment, &c.

TENDA, in *Geography*, a town of Africa, or rather ſeveral towns cloſe together, the capital of a country of the ſame name, on the right bank of the Gambia, ſituated to the ſouth-weſt of Bondou, and ſouth-eaſt of Woolly. N. lat. 13° 2'. W. long. 11° 55'.—Alſo, a town of France, in the department of the Maritime Alps; late capital of a county to which it gave name, annexed to Piedmont, ſituated at the union of the Roia and Brogna. It has only one pariſh church, which is a beautiful ſtructure, a caſtle walled round and flanked with towers, on a rock, which commands the environs of the town. In the 16th century, it came to the duke of Savoy. The ſoil is not fertile, being on all ſides ſurrounded by the Alps; it yields, however, good paſtorage and timber; the rivers alſo furniſh the inhabitants with excellent trout; 22 miles N.E. of Nice.

TENDE, *Col de*, the moſt remarkable paſſage through the Maritime Alps. See ALPS.

TENDEBA, in *Ancient Geography*, a town of Aſia Minor, in Caria.

TENDEBAR, in *Geography*, a town of Africa, in the kingdom of Kaen. N. lat. 13° 15'. W. long. 15° 57'.

TENDER, in a *legal ſenſe*, ſignifies as much as to offer, or endeavour, the performance of any thing, in order to ſave the penalty, or forfeiture, incurred by non-performance.

Thus, to tender rent, is to offer it at the time and place when and where it ought to have been paid; which will ſave the condition of that time, though the landlord reſuſe to accept it.

TENDER, in *Sea Language*, is a veſſel attending on ſome other larger and more conſiderable one. It is employed in the king's ſervice on various occaſions; as to receive volunteers and impreſſed men, and to convey them to a diſtant place; to attend on ſhips of war or ſquadrons; and to carry intelligence or orders from one place to another, &c.

TENDER *Plants*, in *Gardening and Agriculture*, all ſuch as are too delicate and tender in their nature and habits to ſtand, or be raiſed, grown, or produced in the climate of this country, without artificial protection or aſſiſtance, until they have been ſufficiently inured to, and hardened, and habituated againſt the effects of it. It has indeed been obſerved by ſir Joſeph Banks, in a paper containing ſome hints concerning the proper mode of inuring plants of this kind to this climate, inſerted in the firſt volume of the "Transactions of the Horticultural Society" of London, that, reſpectable and uſeful as every branch of the horticultural art certainly is, no one is more intereſting to the public, or more likely to prove advantageous to thoſe who may be ſo fortunate as to ſucceed in it, than that of inuring plants, natives of warmer climates, to bear, without covering, the ungenial ſprings, the chilly ſummers, and the rigorous winters, by which, eſpecially for ſome years paſt, we have been perpetually viſited. Many attempts have, it is ſaid, been made in this line, and ſeveral valuable ſhrubs, that uſed to be kept in our ſtoves, are now to be ſeen in the open gardens; there is, however, ſome reaſon, it is thought, to believe, that every one of theſe was originally the native of a cold climate, though introduced to us through the medium of a warm one; as the gold-tree, *aucuba japonica*, the montan, *pæonia fruteſcens*, and ſeveral others, have been in our times.

In the caſe of annuals, however, it is thought probable that much has been done by our anceſtors, and ſomething by the preſent generation; but it muſt be remembered, it is ſaid, that all that is required in the caſe of an annual, is to enable it to ripen its fruit in a comparatively cold ſummer, after which, we know that the hardeſt froſt has no power to  
 it jure

injure the seed, though exposed in the open air to its severest influence; but a perennial has to encounter frosts with its buds and annual shoots, that have sometimes been so severe with us, as to rend asunder the trunks of our indigenous forest-trees, as stated by Miller.

It is suggested as probable, that wheat, our principal food corn at present, did not bring its seed to perfection in this climate, until hardened to it by repeated sowings. A few years ago, some spring-wheat from Guzerat was, it is said, sown with barley in a small cultivated field: it rose, ear'd, and blossomed, with a healthy appearance, but many ears were, when ripe, wholly without corn, and few brought more than three or four grains to perfection.

In the year 1791, some seeds of *Zizania aquatica* were, it is said, procured from Canada, and sown in a pond at Spring-Grove, near Hounslow; they grew, and produced strong plants, which ripened their seeds; and those seeds vegetated in the succeeding spring, but the plants they produced were weak, slender, not half so tall as those of the first generation, and grew in the shallowest water only; but the seeds of these plants produced others the next year sensibly stronger than their parents of the second year. In this manner the plants proceeded, springing up every year from the seeds of the preceding one, every year becoming visibly stronger and larger, and rising from deeper parts of the pond, until the year 1804, when several of the plants were, it is said, six feet in height, and the whole pond was in every part covered with them, as thick as wheat grows on a well-managed field.

Here, it is thought, we have an experiment which proves that an annual plant, scarcely able to endure the ungenial summer of this country, has become, in fourteen generations, as strong and as vigorous as our indigenous plants are, and as perfect in all its parts as in its native climate and situation.

It is suggested too in the above paper, that the settlement lately made at New Holland gives a large scope for experiments of this kind: many plants have been brought from thence which endure our climate with very little protection, and some of these arrive at puberty at an early period: we have already three, it is said, from the south point of Van Diemen's island, where the climate cannot be wholly without frost; *Mimosa verticillata*, *Encalyptus hirsuta* and *obliqua*.

In contributing still further to the elucidation and accomplishment of this new, very useful, and important object of the above arts, the account which has been given by Dr. Maccullock, of some delicate plants which are cultivated in the open air in the island of Guernsey, with the hints on the means of naturalizing tender exotics, inserted in the first volume of the "Memoirs of the Caledonian Horticultural Society," may also be found highly useful and interesting.

It is certain, it is conceived, that neither the thermometric state of a given country, nor any meteorological condition which we have yet been able to observe, is competent to explain the peculiar affection of plants for particular regions of the earth. The observations of M. Ramond, in the "Annales du Muséum," which have been translated by Mr. Salisbury, shew this, it is said, in a striking point of view. From these we see the persevering regularity with which certain plants affect peculiar elevations, apparently unconnected with the nature of the soil, but bearing a relation alone to particular states of the atmosphere, which we have no means of appreciating. Similar facts are familiar to botanists in our own country, in the very limited zones of elevation affected by our alpine plants.

It is stated farther, that an economical object which depends on this property of plants remains yet to be noticed. This, which is still more in our power, is probably of more consequence than either of those mentioned above; what is meant is the perfect naturalization of the vine. It is well known, that from many of the ordinary varieties cultivated in this country, we can always insure a crop of grapes, but not always a crop of ripe ones. From two or three of these, the chance of ripening out of doors is considerable; from many others, it is hopeless. It is not improbable, that by successive sowings of seeds, other varieties might be produced, still more certain of ripening than those which succeed best with us, *viz.* the miller and the sweetwater. We should thus acquire possession of an article of cultivation of great importance, by which a useful addition would be made to the agricultural proceeds of land in particular situations, and by which we should be enabled to fabricate wines of a quality sufficiently good to compete with those of foreign growth.

A still more important object is, it is thought, the perfect naturalization of the potatoe, an effect as yet but very partially obtained, notwithstanding the length of time during which this valuable root has been a subject of cultivation. It is certain that this imperfect naturalization has been the result of the common practice of propagating by the tubers, to the almost total neglect of the seeds. It is true that seeds have been occasionally sown, and new varieties thus produced; but the experiment has stopped in the first stage, having been always undertaken for the mere purpose of producing these varieties, without any regard to that much more important object, the production of a plant sufficiently hardy to bear at least the first frosts of winter. In the southern parts of our island, it is not a desideratum of much importance, it is said, as the tubers are in general fully formed before the plant is killed by the frost; but in the northern parts it is an object of great consequence, the plant being frequently killed long before the roots have attained maturity. In the Highlands of Scotland, in particular, where a frost will frequently occur early in September, the crop is often prematurely destroyed, and the uses of this vegetable are in consequence materially limited. It is plain, that it would be necessary to sow the seeds of successive generations many times before the requisite degree of hardiness could be expected, and that the process would demand both patience and time. Yet if it should require more of these than we can expect from the ordinary cultivator, it is an experiment which we may at least recommend to those public bodies, which so laudably exert themselves in ameliorating the agriculture and horticulture of this country. The difficulty of procuring seeds from seedling plants, could doubtless, it is thought, be obviated, in some measure, by depriving the young plant of its tubers, and thus compelling it to direct its energies to the other and more common mode of propagation, with which nature has provided all plants.

The writer cannot, however, conclude the suggestions in respect to this object or speculation, without noticing a formidable objection which stands in the way of our attempts to naturalize particular plants. In every case where the useful varieties have been the result of cultivation in a warmer climate from a base and useless parent, it is to be feared, it is said, that the process followed in naturalization, would again throw the plant back to its original state. This objection applies, it is supposed, chiefly to those fruits, such as the peach, the apple, and the grape, which, in their present cultivated state, are almost entirely the produce of art. For this reason, it is not improbable, that all attempts to natural-

ize the grape to a cold climate may fail; yet the trial deserves, it is said, to be made. The case does not apply equally to the potatoe. The original plant appears to be valuable, independent of any artificial character, and would consequently admit of a change, tending even to some degree of deterioration, before it was materially injured in its properties.

**TENDERING**, a name given to the soft tops of deer's horns, when they begin to shoot forth.

**TENDING**, in *Sea Language*, denotes the movement by which a ship turns or swings round her anchor in a tide-way at the beginning of the flood or ebb. Thus, if the flood sets northerly, it is evident that the ship, unless when moored head and stern, will fall into the line of the current, turning her head to the southward, and *vice versa*. This transition from one situation to the other is called tending or swinging. Falconer.

**TENDINOSUM CENTRUM**. See **CENTRUM**.

**TENDON**, **TENDO**, in *Anatomy*, the hard, insensible cords, by means of which muscular fibres are attached to bones. See **MUSCLE**, after the description of the muscular system of animal life; and **FIBROUS System**.

**TENDO Achillis**, the powerful tendon belonging to the muscles of the calf of the leg, placed just above the heel; so named in allusion to the fable, in which Thetis is said to have held her son, Achilles, by this part, when she dipped him in the Styx. See **GASTROCNEMIUS**.

**TENDON of Achilles, Ruptured**. When the tendo Achillis is unfortunately cut, or ruptured, as it may be in consequence of a violent exertion, or spasm of the muscles, of which it is a continuation, the use of the leg is immediately lost; and unless the part be afterwards successfully united, the patient must remain a cripple for life.

The ancient surgeons seem not to have been well acquainted with the rupture of the tendo Achillis, which they probably might mistake for a sprain, or some other complaint. In cases in which this part had been cut, they recommended approximating the separated portions, and maintaining them in contact by means of a future.

When the ruptured tendo Achillis was afterwards better understood, the plan which we have just now mentioned was still continued, the integuments being divided for the purpose of bringing the tendon into view. But that such a painful mode is altogether useless and wrong, it is scarcely necessary for us at the present day to observe.

The superficial situation of the tendo Achillis always makes the nature of the accident easy of discovery, and it is only when there is a considerable degree of swelling (which is very rare), that the case can be at all difficult to understand. When the tendon has been cut through, which is not an ordinary thing, the division of the skin brings the ends of the sinew into view. When the tendon has been ruptured, the patient hears a sound, like that of the smack of a whip, at the moment of the occurrence. In whatsoever way the part has been divided, there is a sudden incapacity, or, at least, an extreme difficulty of standing and walking. Hence the patient falls down, and cannot get up again. Besides these symptoms, there is a very palpable depression between the ends of the tendon, which depression is increased when the foot is bent, and diminished, or even quite removed, when the foot is extended. The patient can spontaneously bend his foot, none of the flexor muscles being interested. The power of extending the foot is still possible, as the peronei muscles, the tibialis posticus, and long flexors, remain perfect, and may perform this motion. *Cœuvres Chirurgicales de Default par Bichat, tom. i.*

The indications are to bring the ends of the divided part

together, and to keep them so, until they have become firmly united. The first object is easily fulfilled by putting the foot in a state of complete extension; the second, namely, that of keeping the ends of the tendon in contact, is more difficult.

In order to have a right comprehension of the indications, we should consider what keeps the ends of the tendon from being in contact. The flexion of the foot has this effect on the lower portion; the contraction of the gastrocnemius and soleus on the upper one. The indications then are to put the foot in an unalterable state of extension, and to counteract the action of the above muscles.

The action of the muscles may be opposed: 1. By keeping these powers in a continual state of relaxation. For this purpose, the leg must be kept half bent upon the thigh. 2. By applying methodical pressure to the muscles; methodical, because it is to operate on the fleshy portion of the muscles, and not on the tendon, the ends of which being depressed by it, would be separated from each other, and, instead of growing together, would unite to the adjacent parts. The pressure should also operate so as to prevent the ends of the tendon from inclining either to the right or left.

This kind of pressure, which the bandage ought to make, seems to have escaped the attention of all authors. Who cannot see, however, that the action of the muscles being by this means resisted, the upper end of the tendon will not have such a tendency to be drawn upward, and separated from the lower one? *Cœuvres Chirurgicales de Default par Bichat, tom. i.*

The famous Petit seems entitled to the honour of having first devised the plan of treating the ruptured, or divided tendo Achillis, by keeping the leg and foot in a particular posture, with the aid of an apparatus. Seeing that the extension of the foot brought the ends of the tendon into contact, it occurred to him that such extension should be maintained during the whole of the treatment, in order to bring about a permanent union. This happy idea, the simplicity of which should have rendered it obvious to all practitioners, once having originated, became the common basis, on which have been founded all the numerous methods of cure, which have been since recommended. *Default par Bichat.*

The celebrated Dr. Alexander Monro, professor of anatomy at Edinburgh, happened to rupture his tendo Achillis. When the accident took place, he heard a loud crack, as if he had suddenly broke a nut with his heel, and he experienced a sensation, as if the heel of his shoe had made a hole in the floor. This sensation, he says, has also been observed by others, though some have complained of a smart stroke, like what would be produced by a stone or cane. Immediately suspecting what had happened, the doctor extended his left foot, in which the occurrence had taken place, as strongly as he could with his right hand, while with the left he pressed the muscles of the calf downward, so as to bring the ends of the broken tendon as near together as possible. In this position he sat, until two surgeons came to his assistance. They applied compresses, and a bent board to the upper part of the foot, and fore part of the leg, both which they kept, as nearly as possible, in a straight line, by a tight bandage, made with a long roller. But as this mode of dressing soon became very uneasy, it was changed for the following one. A foot-sock or slipper was made of double quilted ticking, from the heel of which a belt or strap projected, of sufficient length to come up over the calf of the leg. A strong piece of the same materials was prepared, of sufficient breadth to surround the calf, and this was fastened with lacings. On the back part of this

was a buckle, through which the strap of the foot-sock was passed, so that the foot could be extended, and the calf brought down at pleasure. The leg and foot were wrapt up in soft flannel, fumigated with benzoin, and the bandage was kept on day and night, the belt being made tighter when the doctor was about to go to sleep, and loosened when he was awake, and on his guard. For a fortnight he did not move his foot and leg at all, but was conveyed in a chair on castors from one part of the room to another. After this he began to move the ankle-joint, but in such a gentle manner, as not to give any pain. The degree of motion was gradually increased, as the tendon became capable of bearing it, care being taken to stop, when the motion began to create uneasiness. The affected limb was moved in this way, for half an hour at a time. In a few days, the hollow between the separated ends of the tendon became imperceptible, though the part continued soft much longer. It became, however, gradually thicker and harder, until a knot was at last formed in it, apparently of a cartilaginous nature. Though this was at first as large as a middling plum, and gradually became softer and smaller, yet it did not disappear entirely. Having occasion to go out six weeks after the accident, the doctor put on a pair of shoes, with heels two inches high, and contrived a steel machine to keep his foot in the proper position. This machine, however, he afterwards changed for another, made of the same materials as the former. It was not till five months after the accident, that he thought proper to lay aside all assistance, and to put the strength of the tendon to a trial. See *Monro's Works*, p. 661.

It seems unnecessary to enumerate the various plans devised since the time of Petit. Suffice it to state, that both in a wound and rupture of the tendo Achillis, the ancient method of using a future, for keeping the ends of the tendon in contact, is at present quite exploded, and position of the limb is the grand agent by which the cure is now universally accomplished. The following was Default's method, which, though it was expressly designed to fulfil all the above-mentioned indications, may not after all be a more valuable practical plan, than the one adopted by Dr. Monro. After the ends of the tendon had been brought into contact, by moderate flexion of the knee, and complete extension of the foot, Default used to fill up the hollows on each side of the tendon with soft lint and compresses. The roller applied to the limb made as much pressure on these compresses as on the tendon, and hence this part could not be depressed too much against the subjacent parts. Default next took a compress, about two inches broad, and long enough to reach from the toes to the middle of the thigh, and placed it under the foot, over the back of the leg, and the lower part of the thigh. He then began to apply a few circles of a roller round the end of the foot, so as to fix the lower extremity of the longitudinal compresses. After covering the whole foot with the roller, he used to make the bandage describe the figure of 8, passing it under the foot, and across the place where the tendon was ruptured, and the method was finished by encircling the limb upward with the roller, as far as the upper end of the longitudinal compresses. Default par Bichat.

Certainly this plan seems to answer every object, and may be worthy of being adopted in this country. The continued pressure on the muscles of the calf, by which their action is materially resisted, is too much disregarded by the generality of English surgeons. Consult *Monro's Works Encyclopedie Methodique*, article *Achille, tendon d'*; and *Mémoire sur la Division du Tendon d'Achille*, in *Œuvres Chi-*

*rurgicales de Default par Bichat*, tom. i. p. 306. Cooper's *Dict. of Practical Surgery*.

TENDONS, *Shooting of the, Subfultus tendinum*, in *Medicine*, a slight and repeated convulsive twitching of the muscles, which occurs in the latter stages of low fevers; and, as it indicates great debility, and a very morbid condition of the brain or common sensorium, it is usually reckoned among the dangerous symptoms of fever. See FEVER, and TYPHUS.

TENDON, in the *Manege*, a sort of gristle that surrounds one part of the horse's foot, and is seated between the hoof and the coffin-bone, near the coronet. When a horse has a quitter-bone, the matter that gathers between the coffin-bone and the hoof spoils the tendon, and makes it black; and the cure of such a quitter-bone consists in cutting and extirpating the tendon.

TENDREMENT, Fr. in *Music*, tenderly, equal to *con tenerezza*, Ital. See *CON Affetto*, and *AFFETTUOSO*.

TENDRIL, in *Botany and Vegetable Physiology*. See *CIRCUS*.

TENDUCCI, FERDINANDO, in *Biography*, an opera-singer in soprano, born at Sienna, whence he at first assumed the name of Senesino, or account of the celebrity of a singer of that city, in the early part of the last century; though neither his voice nor style of singing at all resembled that of the great singer and actor, Francico Bernardo detto Senesino, whose voice was a rich and full contralto, and in whose singing and acting there were more of grandeur and dignity than tenderness and expression, which characterized Tenducci's style; and whose voice was a high soprano of a clear silvery tone, which by great pains he had rendered very flexible; but he had formed himself more on Caffarelli's style than on that of Senesino.

He arrived in England, as second man, in 1758, when Potenza was principal. The first notice he obtained was in a cantabile air, set by Caffarelli for himself, in a fine style of grand pathetic, such as six years after, Manzoli's fine adagio in Ezio, "Caro mio bene addio," was composed in by Pescetti.

It was in 1759, during the reign of Cocchi's "Ciro rionofciuto," that he became a favourite of the public: for though a young performer, and only second in rank under Potenza, he had a much better voice and manner of singing than the performer to whom he gave precedence.

In 1760 he went to Scotland, and we hear no more of him till 1763, when he returned to London, and performed the principal man's part in Dr. Arne's *Artaxerxes*, of which the success was greatly owing to his talents.

At this period, Bach and Abel established a weekly subscription concert in Hanover-square, which was better patronized and longer supported than perhaps any one had ever been in this country, having continued full twenty years with uninterrupted prosperity, at which, during the chief part of the time, Tenducci was the principal singer.

In 1770 he succeeded Guadagni as first man at the great opera, performing that year with the Grassi in "Corroe," and the next year in "Semiramide rionofciuta."

In 1764 he went to Ireland, where he and Miss Brent performed together in *Artaxerxes*.

In 1765 an Italian opera was performed in Dublin, in which he and the Cremonini sung principal parts in *Mithridates*, in the principal cities of that country.

Some time after he returned to London, and was engaged at the opera, where, in 1785, he revived Gluck's *Orfeo*.

Such is the outline of his professional career in public. The events of his private life are still more varied.

He had not been long in England before he was thrown

into the king's bench for debt, where he embellished that residence by his talents, and amused its inhabitants. He was, however, allowed to attend evening concerts elsewhere, attended by a *garde du corps*. But on these occasions, a Jewish lady, his patroness, carried him in her carriage to the performance, and conducted him safe back with his attendant to his limited residence; where, during a part of the time, he had the honour of Dr. Smollet for his neighbour.

In Scotland he sung at the Edinburgh concerts, and gave lessons in singing; by which occupation he improved his own talents so much, that he returned to London a much better singer than when he left it. So true is the observation of Aristotle, that no art or science is well learned but by *teaching*, when it is necessary to give reasons for what in private practice is done mechanically.

In Ireland he married a lady of considerable fortune, who was enchanted by his talents.

In Italy, whither he carried this lady, he was unmarried, the laws of that country forbidding conjugal union to castrati. And on his application to the pope for a dispensation, it was refused; though the petitioner said that his reason for marrying was, the operation in his youth not having been completely performed; "why then," says his holiness, "let it be done more effectually;" and he was obliged to separate himself from his tender spouse, and to console herself with a more efficient husband.

When he quitted the stage, he employed his whole time in teaching to sing; had many scholars, and a good method of instruction; giving to his pupils, in English, a set of axioms or rules of study and practice translated from the Italian, drawn up, as he said, by himself; but which, after his decease, were found in the *Solfeggi* of Aprile.

Notwithstanding the great number of his scholars, his income was insufficient to keep him out of debt, or even the king's bench, without the ingenious expedient of becoming a bankrupt, by which he defrauded all his creditors, and died insolvent, being, as has been reported, buried at the expence of his countrymen, who made a collection for that purpose at the Orange coffee-house. But from better authority, we have been informed that he died at Genoa.

Tenducci had much professional merit; but as to probity, honour, and ideas of right and wrong, they never seem to have extended further than convenience and personal safety.

TENDUNCULO, in *Geography*, a river of Africa, which runs into the Indian sea, S. lat. 19° 20'.

TENEA, in *Ancient Geography*, a town of Corinth, on the frontiers of Sicyonia, S. of Epicria. It pretended to derive its foundation from the Trojans made prisoners in the isle of Tenedos, and brought into this country by Agamemnon. Apollo was much honoured here.

TENEBRÆ, DARKNESS, in the *Romish Church*, a service performed on the Wednesday, Thursday, and Friday before Easter, in commemoration of the agony of our Saviour in the garden; and the darkness that overspread the earth at the time of his crucifixion.

TENEBRIO, in *Entomology*, a genus of the Coleoptera order of insects, the generic character of which is, that the antennæ are moniliform, with the last joint rounded; the thorax plano-convex, margined; the head exerted, and wing-sheaths stiffish.

In the insects of this genus the body is oblong-oval, and in most species somewhat pointed at the extremity. Several species are also destitute of wings. This is a numerous genus, and is divided by Fabricius and others into several distinct genera, under the appellations of *Pimelia*, *Bleps*,

*Aturnus*, &c. In Gmelin's edition of Linnæus it comprehends 63 species. The European species are denoted by an asterisk.

A. *Six filiform Feelers; anterior Legs formed for digging, palmate-dentated; including the Scaritæ of Fabricius and Pallas.*

## Species.

COMPLANATUS. Black, with a subquadrate thorax, and smooth shells or wing-sheaths; of a large size. Found at Cayenne.

MARGINATUS. Black, with a subquadrate thorax; fulcated shells; blue margin. Found at Cayenne.

GIGANTEUS. Black, with fulcated mandibles, and smooth shells. Found in Africa; nearly allied to the next species, but thrice as large.

SUBTERRANEUS. Black, with the fore-part of the head fulcated, and striated shells.

CYANEUS. Blue, very smooth; antennæ and feet black. Found in New Holland.

\* FOSSOR. Pitchy. Found in sand-hills, which it perforates.

\* CURSOR. Brown; oblong thorax; five angles denticulated. Found as the former.

ARABES. Black; ferrated thorax; antennæ and feet testaceous. Found in the East.

MINUTUS. Black; thorax margined; antennæ clavated, and feet pitchy. Found in Sweden; and twice as large in Saxony.

COLLARIS. Black, with shells punctate-striated, and head brown; antennæ and feet pitchy; the anterior spinous. Found at Berlin.

BUCEPHALUS. Wholly brown, punctated; eyes black. Found in India.

B. *With unequal filiform Feelers.*

ATRATUS. Wholly black, smooth. Found in Egypt.

C. *With four Feelers; the anterior subclavate; the posterior filiform; the Tenebriones of Fabricius, and Mylarides of Pallas.*

LAMINATUS. Black; thorax subquadrate, smooth; shells fulcated; anterior legs incurvated at the apex, and ferruginous lamina acute. Found in India; the largest of the genus.

GIGAS. Black; shell striated; thorax smooth. Found in Surinam.

PUNCTATULUS. Black; thorax quadrate; margin subdenticulate; shells striate-punctated. Found in India; of a large size.

SERRATUS. Black, smooth; shells striated; posterior legs striated. Found in Sierra Leone.

\* MOLITOR. Wholly black; thighs anterior thicker:—an insect often seen in houses, one of the smaller kinds, proceeding from a larva commonly known by the name of meal-worm, from its being so frequently found in flour, &c.; it is of a yellowish-white colour, about an inch long, slender-bodied, and of a highly polished surface, and is considered as the favourite food of the nightingale, in its captive state, and said to remain two years before it changes into a chrysalis.

LURIDUS. Black, with brown feet. Found in Brasil.

CHALYBEUS. Violet, with feet and antennæ pitchy. Found in Guinea.

MAURITANICUS. Black, beneath pitchy; margins of the

the thorax anterior and posterior angulated. Found in Algiers.

**VARIEGATUS.** Oblong, with varied brown and cinereous. Found in Africa.

**ABBREVIATUS.** Ovate, black, with shell striated, and head tuberculated. Found in India.

**CAPENSIS.** Ovate, black; shell striated; anterior legs dentated-spinous. Found at the Cape of Good Hope.

**CORNUTUS.** The margins of the double-horned thorax crenated, and the angles projecting. Found in Smyrna.

**SANGUINIPES.** Black, with antennæ and feet sanguineous. Found in New Holland.

**BUPRESTOIDES.** Black; oval, thorax margined: the connate shells smooth. Found at the Cape of Good Hope.

**DERMESTOIDES.** Black; thorax oval, margined; shells striated. Found in Saxony.

**CULINARIS.** Ferruginous; shells striated; shield emarginated. Found in Spain and Sweden.

**BARBARUS.** Black, very smooth; thorax orbiculated; the shield of the head on the fore-part, with the margin elevated. Found in Mauritania.

\* **ERRATICUS.** Black; the antennæ, suborbiculate thorax, and shells ferruginous; brown at the apex.

**PALLENS.** Pale yellow testaceous; thorax transverse. Found of a small size at the Cape of Good Hope.

**FERRUGINEUS.** Ferruginous, with shells striated testaceous. Found in Africa.

\* **VILLOSUS.** Brown, cinereous-velvete, shells smooth and ferruginous.

\* **CARABOIDES.** Black; thorax oval, margined; shells striated.

**BRUNNIPES.** Black, smooth; shells striated; antennæ and feet ferruginous. Found at Dresden.

**LEVIGATUS.** Oblong, black, with smoothish shells. Found in Africa, of a less size than the molitor.

**GIBBOSUS.** Subovate; wholly brassy, shells gibbous-convex; the very fine striæ crenulated. Found in Brazil.

**SPINIMANUS.** Thorax margined, smooth, shells very smooth; posterior obtuse; fore-legs produced with a very strong arched spine. Found in Southern Russia.

**UNCINUS.** Apterous, black; thorax margined, subequal; shells striated-punctated and angulate; thighs anterior, clavated, very large, biuncinate. Found in Spain.

**PICEUS.** Depressed, black; beneath pitchy; shells striated. Found in Saxony.

**CYLINDRICUS.** Very black; thorax with elevated points; antennæ brown; the tarsi beneath yellow-haired. Found at Berlin.

**MONTANUS.** Wholly black; shells opaque. Found in Hungary.

**TRISTIS.** Black, sub-opaque, varied with excavated points. Found in Carniola.

**POMONÆ.** Above pitchy, beneath black; shells with five elevated striæ. Found in Carniola.

**CAPREÆ.** Black; points impressed on the thorax and shells testaceous. Found in Carniola and Switzerland.

**FLAVUS.** Yellow, with black eyes. Found in Carniola.

**ÆSTIVUS.** Black; feelers and feet yellow. Found in Denmark.

**STRIATUS.** Black; the abdomen beneath densely striated. Found in Denmark.

**FESTINANS.** Wholly black, smooth; thorax ferruginous.

**GLOBOSUS.** Black; thorax globose; two rough lines elevated. Found in Siberia.

**INCURVATUS.** Wholly pitchy; shells striated across the middle. As the last.

**OVATUS.** Ovate, blackish-brown; shells with eight striæ, smooth.

**ROTUNDATUS.** Black, wholly smooth: the coleoptera rotundata.

**SUBVILLOSUS.** Wholly ferruginous, subvelvete.

**GLABER.** Wholly ferruginous, smooth. The four last found in France.

\* **LIGNARIUS.** Thorax with two cavities; shells violet or red; antennæ and feet ferruginous.

**LARDARIUS.** Oblong, yellow-fulvous; eyes black; shells with punctated striæ. Found in Belgium.

\* **CURVIPES.** Ovate, pitchy; shells punctated-striate; thighs crenated; the hinder beneath ciliated.

\* **BICOLOR.** Ovate; shells striated; above black; the antennæ beneath and feet ferruginous.

\* **ATYER.** Black; antennæ ferruginous.

\* **LUNATUS.** Black; depressed thorax lunated; shells striated; feet ferruginous.

\* **HISPIDUS.** Black, rough; shells striated; a spot at the base on both sides red; the antennæ and legs red.

\* **GLABER.** Ferruginous; head and thorax smooth, and shells black; these striated; mouth ferruginous; feet livid.

**TENERIO** *Mortifagus*, a species of the *Pinelia*, (which see,) in the Gmelinian edition of the Linnæan system, thus described by Dr. Shaw. It is a coal-black insect, measuring about an inch in length, of rather slow motion, and distinguished by the remarkably pointed appearance of the wing-sheaths, which at their extremities project a little beyond the abdomen; they are also perfectly connate or undivided, forming a complete covering to the body, and being carried over the sides to some distance beneath, and the insect is totally destitute of real or under wings. It is usually found in dark neglected places, beneath boards, in cellars, &c. and if handled, especially if crushed, diffuses a very unpleasant smell.

**TENEBRIVM**, in *Ancient Geography*, a promontory of Spain, belonging to the Iberæones. Ptol. It lay S. of the mouth of the river Iberus.

**TENEDOS**, in *Geography*, an island of the Grecian Archipelago, near the coast of Asia, and very near the Troade. This island has been successively celebrated by Homer and Virgil. The latter thus describes it:

“Est in conspectu Tenedos, notissima famâ  
Insula, dives opum, Priami dum regna manebant;  
Nunc tantum finus et statio malefida carinis.”

According to Diodorus Siculus, it had anciently been called Leucophris; but when Tenos or Tennes built a town upon it, he called it Tenedos. Bochart, however, derives its name from the Phœnician word Tin-edum, red clay, which was found here, and used for making earthen-ware. Pausanias says, that this island, which was situated within sight of the city of Troy, became miserable after the capture of that city, and was obliged to surrender to its neighbours, who had built Alexandria upon the ruins of Troy. It was one of the first conquests of the Persians, who made themselves masters of it, after having defeated the Ionians at the isle of Lada. It took part with the Athenians against the Lacedæmonians, when an admiral of the latter people ravaged it, and drew from it contributions. The Romans had possession of it, and Verres pillaged the temple, and carried away the statue of Tennes, the supposed founder of the town. Strabo represents it as 24 stadia in circumference, and places it at the distance of 11 stadia from the continent; but Pliny states this distance to be 12 miles. Olivier computes the distance to be nearly 3000 toises: and he says, that the town is at the distance of about five leagues

from the entrance of the Hellespont. This position has always rendered Tenedos important. Vessels bound to Constantinople find shelter in the ports of this island, or safe anchorage in the roads, when the winds are contrary and the weather bad. The emperor Justinian established in this island a magazine for receiving cargoes of corn transported from Egypt, 180 feet long, 90 broad, and proportionally high. During the troubles of the Greek empire, Tenedos sustained many vicissitudes. It was for many years a place of rendezvous for pirates. Scantly peopled and ill defended, it passed betimes under the Ottoman domination. The caliph Othman seized it in the year 1302, and in the possession of it, he was enabled to subdue the other islands of the Archipelago. During the minority of Mahomet IV. the Venetians retook it after the complete defeat of the Turkish fleet in the strait by the admiral Mocenigo, in 1656: but in the following year, the admiral having been killed in a second engagement, the Venetian fleet retired, and this island fell again under the power of the Turks, who have preserved it without interruption till the present day. The harbour is small, and can only receive merchant vessels: it is formed by a jetty even with the water's edge, and a tongue of land, on which is constructed the citadel that defends the entrance, and can at most secure it against being surpris'd by a privateer. The town is built in form of a semicircle, in a valley, and on the declivity of two hills: its population is from 5000 to 6000 souls, judging from its extent, and from the number of persons who pay the karatch. Its inhabitants, who are Turks and Greeks in equal numbers, are almost all occupied in the culture of the lands, few of them being mariners. The island is under the administration of a waiwode or governor, an aga commandant of the citadel, and a cadi or judge. The defenders of the town are 200 or 300 janizaries. The town is commanded by a pyramidal mountain of small elevation, that seems to have been formed by the action of a volcano, the traces of which are discoverable. In the environs is found a granite remarkable for pieces, of various sizes, of felspar crystallized. On the right of the mountain, in passing from the town towards the W., is a sandy plain, far from fertile, and almost entirely covered with vines. The hills, in general, are naked, dry, and little susceptible of culture. Those on the south of the town are calcareous; and the rock is more or less chalky and loaded with sea-shells.

Tenedos produces little corn, fruit, or herbage. The vine is the only article of wealth of this country, and its culture the principal occupation of the inhabitants. Muscadel wine is made in considerable quantities. From Tenedos are annually exported upwards of 600,000 okes of wine, producing to the farmer more than 30,000 piastres. This wine passes to Constantinople, Smyrna, and Russia. This island also exports a small quantity of brandy. The climate of Tenedos is more temperate than that of the Dardanelles: it seldom freezes here, and the summer heats are moderated by the N.N.E. wind, which blows regularly during the day. The houses have terraces of flat roofs. The Greek inhabitants are less gay than those of the other island: in the streets they are silent and melancholy, avoiding through fear the attention of the Turks; but when they can indulge themselves in mirth without danger, they surrender themselves to a sort of extravagant joy and delirium. The coast of Troy is frequently the theatre of their orgies and the field of their pleasures: thither they repair on the occasion of a wedding or of a festival, and there, under the shade of a plane-tree or oak, they pass the whole day in dancing, singing, eating and drinking. The females, however, are kept within the bounds of decorum, and might be compared, from their

features and their shape, to the most beautiful models which antiquity has transmitted to us. N. lat. 39° 53'. E. long. 26°. Sonnini. Olivier.

TENELLA, *τενελλα*, in *Ancient Music*. As some conquerors at the Olympic games were not so fortunate as to have poets for their friends, or so rich as to be able to purchase odes on their particular victories, which were rated very high by bards of the first class; in honour of such, the old hymn to Hercules, of Archilochus, was sung by the friends of the conquerors only, if they could not afford to engage a band of professed musicians. The scholiast on Pindar's ninth Olympic tells us, that to supply the want of a citharædist, Archilochus framed a word in imitation of the sound of a cithara, which word (*Tenella*, *ΤΕΝΕΛΛΑ*), when there happened to be no musician present, the leader of the chorus chanted forth, and was answered by the rest of the chorus, in the words of the hymn, *Ω Καλλιμαίε, χαίρει, Ο glorious Viator, hail!* at every comma, or pause of which, this burden was again repeated.

TENEMBER, in *Geography*; an island in the East Indian sea, 12 miles long and 3 broad. S. lat. 6° 50'. E. long. 132° 45'.

TENEMENT, TENANCY, in *Law*, a house or lands, depending on a manor, or lordship; or a fee, or farm held of a superior lord, and which he may recall, when the term or condition is expired.

TENEMENT, *Frank*, is any lands, house, office, or the like, in which a man has estate for life, or in fee.

TENEMENT, *Base*, is where a man holds lands, &c. at the will of the lord.

Yet Kitchen, Briton, &c. make frank tenement and base tenement opposites; on which footing, frank tenement should be where the tenant is at liberty to quit it when he pleases.

TENEMENTARY LANDS, among our ancestors, were the outlands of manors, which the Saxon thanes, or nobles, let out to tenants under arbitrary rents and services.

TENEMENTIS LEGATIS, in *Law*, a writ which lies in London, and other places, where the custom is to devise tenements by last will as well as personal goods and chattels, for the hearing of any cause relating to them.

TENEN, or KNIN, in *Geography*, a town of Dalmatia, situated on the borders of Bosnia, and the see of a bishop; 48 miles S. of Bihacs.

TENENDUM, in *Law*, is a clause in a deed, in which the tenure of the land is created and limited. The office of a tenendum is to limit and appoint the tenure to the land which is held, and how, and of whom it is held. The tenendum seems now to be incorporated with the *habendum*, for we say, to have and to hold, in which clause the estate is limited, &c.

TENENTES NATIVI. See NATIVI.

TENENTIBUS in *Affisa non Onerandis*, in *Law*, a writ which lies for him to whom a disseisor has made over land, of which he disseised another; requiring that he be not disturbed in affize, for the damages awarded, if the disseisor have wherewithal to satisfy them.

TENEREZZA, tenderness, feeling, equivalent to the French term *tendrement*.

TENERIA, in *Geography*, a town of the island of Cuba; 45 miles N.W. of Villa del Principe.

TENERIFFE, one of the Canary islands, the second in dignity, but the first probably with regard to wealth and fertility. It is about 70 miles in length, and its mean breadth is about 22 miles; its surface contains 1540 square miles, having, at an average, about 45 persons to the square mile,

## TENERIFFE.

mile. The number of acres is 985,600, which, upon an average, allots about 10 acres to every individual in it; the number of inhabitants being calculated to be nearly 100,000. Of these there is annually a considerable migration to the Spanish colonies in South America. The poor of Teneriffe are easily persuaded to migrate, as the proprietors of the land do not give them sufficient employment throughout the year; and they have not the resource of manufactures, except a trifling one in silk, chiefly stockings. The price of labour is under a shilling a day; and, beside corn and roots, the principal food of the common people is confined to cod-fish, caught on the neighbouring coast of Africa, or imported from North America. This island was formerly called Nivaria, which appellation it derived from the circle of snow that furrounded the peak of Tenda, now called the peak of Teneriffe; which name was given to it, as it is said, by the inhabitants of Palma island, in whose language *tener* signifies snow, and *esse* a mountain. The figure of this island is triangular, as it extends into three capes, the nearest being about 80 leagues or more from the coast of Africa. The historical celebrity of this island has been very much owing to its *Peak*, elevated to a considerable height from a base lying a little to the S.W. of its centre. Of its height we have various statements by different writers, who have ascended to its summit. Dr. Heberden, whose observations in ascending it are published in the *Phil. Transf.* vol. xlvii. makes its height above the level of the sea to be 2566 fathoms, or 15,396 English feet; and he says that this measure was confirmed by two subsequent observations by himself, and another made by Mr. Croffe, the consul. Nevertheless, chevalier de Borda, who measured the height of this mountain in August 1776, makes it to be only 1931 French toises, or 12,340 English feet. Mr. Johnstone, a merchant of Madeira, being on board ship in the offing of Orotava, took the angles made by a line from the horizon to the summit of the Peak, at two different spots, and measuring the distance between them by the log, determined the perpendicular height of the Peak to be 2023 English fathoms, being nearly the same as Chev. de Borda had calculated from a base measured upon land. From the comparative observations of Monf. de Borda's barometers, upon the Peak, and by the sea-side, the mountain's height came within two fathoms of the geometrical measurement. The Hon. Grey Bennet, who made a journey to the top of the Peak in 1810, states its height to be about 12,500 feet. M. de Lemanon and Monges, on the 26th of August 1785, ascended the Peak, and stating its elevation above the level of the sea to be near 1900 toises, made some chemical experiments, in order to compare the phenomena at that height with those which occur in our laboratories. They observe, that the crater of the Peak is a perfect solfatara or laboratory of sulphur; its diameter being about 50 toises by 40, rising with a steep and rapid ascent from W. to E. On the edges of the crater, and particularly towards the lowest part, are several apertures or vents, exhaling watery and sulphuric acid vapours, the heat of which raised the thermometer from 9° to 34°. The interior of the crater is covered with yellow, red, and white clay, and fragments of lava partly decomposed. Under these were found beautiful crystals of sulphur, forming rhomboidal octohedra, some of which were an inch thick. The steam exhaled from the apertures was pure water, not at all acid. The evaporation of liquids, and the cold thus produced, were very considerable. The action of the acids on metals, earths, and alkalies was slow, and the bubbles that escaped during the effervescence were much larger than usual. The production of vitriols afforded a singular phenomenon. That of iron instantly assumed a

fine violet colour, and that of copper precipitated with a very vivid hue. The smell and strength of liquors appeared not to have lost any thing at this elevation, and the volatile alkali, ether, and alcohol, retained the same strength. Several experiments were made with a view of ascertaining the nature of the vapours exhaled from the crater, and whether they contained inflammable air, fixed air, or marine acid. From these he concluded that no fixed air exhaled from the crater, and also that the atmospheric air resting upon it contains very little, and that the inflammable vapours and sulphuric acid gas alone are considerable, and indeed perceivable. The atmospheric electricity was considerable and positive. Many new varieties of volcanic scorals were discovered. See *La Perouse's Voyage*, vol. ii. p. 226, &c.

Dr. Heberden gave Sir Joseph Banks some salt which he collected on the top of the mountain, where it is found in large quantities, and which he supposed to be the true natrum, or nitrum, of the ancients. Although the vortex appears sharp, and of the exact resemblance of a cone, yet it is flat for the extent of an acre of ground, in the centre of which is a dreadful volcano, which frequently breaks out into flames, so violent as to shake the whole island with an incredible force. Smoke constantly issues from the mountain, near its summit, but no eruption has occurred since the year 1704, when the port of Garrachica was destroyed, and the harbour filled by the lava. The island of Teneriffe is divided in the middle by a ridge of mountains, which have been compared to the roof of a church, the Peak forming the spire or steeple in the centre. An author well acquainted with the island says, that if you divide it into twelve parts, ten of these consist of rocks, woody and inaccessible mountains and vineyards; and yet, from the small remainder of arable ground, he has seen 250,000 hanacks of wheat, besides immense quantities of rye and barley, produced. The greatest part of the island is volcanic, and all its rocks are lava. Mr. Bennet (*Transf. of the Geological Society*, vol. ii.) conceives, that formerly a very large crater, 12 miles in diameter, existed, the sides of which, under the name of *Las Foldas*, may be still traced a great way. The crater at the top of the Peak is but small, and somewhat in activity. The lavas vary in their appearance: some are composed of hornblende and felspar, without any foreign body; these are porphyritic: some are composed of green-stone, and contain olivin, augite, and zeolites: some are basaltic; these decompose the soonest, and constitute the most fertile soil: there are also pumice in abundance, tufa ashes, and a lava resembling obsidian. Every circumstance, it is said, argued in favour of a volcanic formation, except the form of the mountains, whose irregular ridges, declivities, and ascents, appeared very different from those exhibited by volcanic mountains. In the plain beyond Laguna, on the Orotava side, the soil was not in the least volcanic, but composed of fine mould, or virgin earth; a mixture of clay, vegetable earth, and sand. Hollows, 30 feet deep, left dry by rivulets, exhibit no volcanic appearance. Immediately under the superficial soil was a layer of deep loam, next, one of tough clay, and all below was an irregular mixture of clay and sand. Elsewhere the hills consisted of indurated clay, and clay and iron, without any marks of the action of fire. In the whole island, there is no pure flint or sand-stone. Its mountains are of two sorts; one, evidently volcanic; the other, primary and composed of indurated clay, or of clay and calx of iron. In the low plains are layers of loose and soft argillaceous earth. (See Dr. Gillan's remarks in the 111 vol. of the *Embassy to China*, p. 118—120.) Although the people live on scanty and coarse fare, they are not much subject to disease, and instances of longevity, even to 100 years,

years, are said not to be rare amongst them. The air is dry and pure. The variations of the thermometer seldom exceed  $14^{\circ}$ , from  $68^{\circ}$  to  $82^{\circ}$ , in the inhabited part of the island. (See GUANCHES.) To the eastward of Santa Cruz, says Mr. Anderson (Cook's Third Voyage, vol. i. p. 22. &c.) the island appears perfectly barren. Ridges of hills run towards the sea, between which ridges are deep vallies, terminating at mountains or hills that run across and are higher than the former. Those that run towards the sea are marked by impressions on their sides, which make these appear as a succession of conic hills, with their tops very rugged. The higher ones that run across are more uniform in their appearance. The basis of the hills is a heavy, compact, blueish stone, mixed with some shining particles; and on the surface, large masses of red friable earth, or stone, are scattered about. The little earth, that appeared here and there, was a blackish mould. There were likewise some pieces of slag, one of which, from its weight, and smooth surface, seemed almost wholly metalline. The mouldering state of these hills is, without doubt, owing to the perpetual action of the sun, which calcines their surface. "After walking about three miles," says Mr. Anderson, "I found no alteration in the appearance of the lower hills, which produce great quantities of the euphorbia Canariensis. I met with nothing else growing there, but two or three small shrubs, and a few fig-trees near the bottom of the valley. Most of the laborious work in this island is performed by mules, horses being to appearance scarce, and chiefly reserved for the use of the officers: they are of a small size, but well shaped and spirited. Oxen are also employed to drag their carts along, upon a large clumsy piece of wood. In my walks and excursions I saw some hawks, parrots, which are natives of the island, the sea-swallow or tern, sea-gulls, partridges, wagtails, swallows, martins, blackbirds, and Canary birds in large flocks. There are also lizards of the common, and another sort; some insects, as locusts; and three or four sorts of dragon-flies." Mr. Anderson was informed that a shrub is common here, agreeing exactly with the description given by Tournefort and Linnæus of the tea shrub, as growing in China and Japan. Another botanical curiosity, mentioned by him, is what they call the impregnated lemon. It is a perfect and distinct lemon, inclosed within another, differing from the outer one only in being a little more globular. The leaves of the tree that produces this sort, are much longer than those of the common one; and it was represented to him as being crooked, and not equal in beauty. Mr. Anderson learnt also, that a certain sort of grape growing here is reckoned an excellent remedy in phtisical complaints; and the air and climate in general are remarkably healthful, and particularly adapted to give relief in such diseases. This he endeavoured to account for by its being always possible to procure a different temperature of the air, by residing at different heights in the island: and he expressed his surprize that the English physicians had never thought of sending their consumptive patients to Teneriffe, instead of Nice or Lisbon. They reckon that 40,000 pipes of wine are annually made, the greatest part of which is either consumed in the island, or made into brandy, and sent to the Spanish West Indies and North America.

In the Embassy to China (vol. i.) the quantity of wine, consisting principally of white wine, said to be exported from Teneriffe, is about 25,000 pipes annually made in the island. Part is sent to South America: and the English take off a considerable quantity in return for manufactures; and the North Americans in payment of corn, slaves, horses and tobacco, which last article is contraband and smuggled.

Tobacco or snuff is in universal use; and that which is legally imported is sold at so high a price, that the temptation to smuggling is irresistible. The royal monopoly extends even to orchilla or archil, a substance used in dyeing. Formerly there was made at Teneriffe a great quantity of Canary sack, which the French call "vin de Malvasia," and we, corruptly after them, name Malmsey (from Malvasia, a town in the Morea, famous for such luscious wine.) In the 17th century, and still later, much of this was imported into England, and little wine is now made there except that described by Capt. Cook, and which he compares with Madeira, the latter being as much superior to the former, as strong beer is to small. But the great difference of price is a recommendation of it. Besides wine, which is the chief produce of the island, beef may be had at a moderate price. The oxen are small and bony, and the meat lean. Hogs, sheep, goats, and poultry, may also be bought at a moderate rate: and fruits, such as grapes, figs, pears, mulberries, plantains, and musk melons, are in great plenty. Their pumpkins, onions, and potatoes, are also very good of their kind. The Indian corn, which is their produce, and also their fruits and roots, may be had at a very reasonable rate. They have no plentiful supply of fish from the adjoining sea; but a considerable fishery is carried on by their vessels upon the coast of Barbary; and the produce of it sells at a reasonable price. Capt. Cook says that he found Teneriffe to be a more eligible place than Madeira for ships bound on long voyages to touch at. At Teneriffe they make a little silk; but unless we reckon the filtering-stones, brought in great numbers from Grand Canary, the wine is the only considerable article of the foreign commerce of Teneriffe. None of the race of inhabitants found here when the Spaniards discovered the Canaries, now remain a distinct people, having intermarried with the Spanish settlers; but their descendants are known from their being remarkably tall, large-boned, and strong. The men are in general of a tawny colour, and the women have a pale complexion, entirely destitute of that bloom which distinguishes our northern beauties. The Spanish custom of wearing black clothes continues amongst them; but the men seem more indifferent about this, and in some measure dress like the French. According to Capt. Cook, the peak of Teneriffe is situated in N. lat.  $28^{\circ} 18'$ , and upon this supposition its longitude will be

By {	The time-keepers	$17^{\circ} \ 0' \ 30''$	} West.
	Lunar observations	$16 \ 30 \ 20$	
	Mr. Varila	$- \ 16 \ 46 \ 0$	

But if its latitude be  $28^{\circ} 12' 54''$ , as in Maskelyne's British Mariner's Guide, its longitude will be  $13' 30''$  more westerly. The variation (August 1776) by a mean of all Capt. Cook's compasses was found to be  $14 \ 41' 20''$  W. The dip of the N. end of the needle was  $61^{\circ} 52' 30''$ .

TENERIFFE, a town of South America, in the government of the Caraccas, and province of St. Martha; 80 miles S.S.W. of St. Martha. N. lat.  $10^{\circ} 2'$ . W. long.  $74^{\circ} 30'$ .

TENESMUS, in *Medicine*, an incessant and urgent desire to go to stool, while the evacuations are exceedingly scanty, of a mucous or bloody appearance, and are attended with scarcely any relief of the distressing sensation which preceded them. It may be brought on by any cause which excites excessive irritation in the rectum, either directly, or by sympathy with neighbouring organs, such as the bladder, uterus, prostate gland, or urethra. Thus it is frequently a symptom of a stone in the bladder, of inflammation of the neck of that organ, of fistula, of gonorrhœa virulenta, and also of pregnancy. In its most acute form, tenesmus more commonly

commonly occurs as a consequence of disease affecting the intestines themselves, and more especially of dysentery: it is also frequently excited by ascarides, or hæmorrhoidal tumours within the rectum. See DYSENTERY.

The treatment of this affection must of course be adapted to the nature of the irritation which has occasioned it; and the removal of the irritating cause will generally be followed by the cessation of the effect. When this, however, cannot be accomplished, the introduction of opium as a suppository into the rectum, or united with a starch glyster, will often procure essential relief.

TENESSEE, in *Geography*. See TENNESSEE.

TENESUR, a town of Egypt, on the west branch of the Nile; 3 miles S. of Amrus.

TENET, a particular opinion, dogma, or doctrine, professedly held by some divine, philosopher, &c.

The distinguishing tenets of the several sects in religion, and philosophy, see under the names of the sects themselves.

TENEZ, or TENES, in *Geography*. See TENNIS.

TENEZA, a town of Morocco; 43 miles W.S.W. of Morocco.

TENGA, in *Botany*, a name by which some authors have called the cocoa-nut tree, or palma indica nucifera of other writers.

TENGAN, in *Geography*, a city of China, of the first rank, in Hou-quang; 550 miles S. of Peking. N. lat.  $31^{\circ} 20'$ . E. long.  $113^{\circ} 17'$ .

TENGAPATAM, a town of Hindoostan, on the sea-coast, in the country of Travancore; 20 miles S.W. of Travancore.

TENGI, a town of Persia, in the province of Schirvan; 25 miles N. of Scamachie.

TENGILO, a river of Lapland, which falls into the Tornea, which, as well as the lake and mountain of Niemi, has been celebrated by Maupertuis for picturesque beauty.

TENGIS, a lake of Independent Tartary, about 140 miles in length by half that breadth, being the largest lake in Asia after the seas of Aral and Baikal. It is also called Balkash or Palcaté. This lake, with two others that are very considerable, belong to the Kalmucks subject to China.

TENGMO, a small island on the E. side of the gulf of Bothnia. N. lat.  $63^{\circ} 10'$ . E. long.  $21^{\circ} 52'$ .

TENG-TCHOUEN, a city of China, of the second rank, in Yun-nan; 1182 miles S.W. of Peking. N. lat.  $26^{\circ} 2'$ . E. long.  $99^{\circ} 49'$ .

TENGZEGZET. See TENZEGZET.

TENIA. See TÆNIA.

TENIERS, DAVID, the elder, in *Biography*, was born at Antwerp in 1582. He received his education in painting in the school of Rubens, and under that great artist's immediate tuition, obtained the mode of preparing his grounds, and managing his materials. Intending to continue the study of historic painting, he went to Rome; but there abandoned it, and attached himself to his countryman, Adam Elsheimer, under whom he continued for six years to study landscape, and from him most probably acquired the neatness of pencilling for which his works are esteemed.

On his return to his native country, he blended the styles of both his masters, and employed the compound in a novel and ingenious manner, upon subjects original and at the same time agreeable; such as merry-makings, both interior and at the doors of cabarets; rural sports, cattle, sheep, and those who tended them; numerous groups and grotesque combinations; such as the temptation of St. Anthony, &c. For pictures of these kinds, he was fortunate enough to find

admirers and purchasers; and they would still have been the theme of admiration, had not his son, following the same track, have proved how possible it was to proceed infinitely farther. He died in 1649, aged sixty-seven.

TENIERS, DAVID, the younger, son of the foregoing artist, was born at Antwerp in 1610, and was initiated in the art of painting by his father; but he afterwards became a disciple of Adrian Brauwer, and is also said to have had the happiness and honour of receiving instructions from Rubens. The subjects and the style he adopted were, as we have said, the same with those employed by his father; but with a more fertile imagination, he produced compositions infinitely more varied and ingenious, with colouring and effect more vivid and engaging, more rich and transparent; and with a facility of execution perfectly enchanting. It is true they seldom exhibit much research of character or expression; what there may be of those qualities, was more probably a fortunate hit, than any result of meditation or intention. In this respect Jan Stein, and our own Wilkie, have as much the superiority over Teniers, as he possesses by the power of his execution.

At the first display of his powers he was not so successful as he merited, but it was not long that he lay neglected: the archduke Leopold being made acquainted with his merits, immediately distinguished him by his patronage; appointed him his principal painter; honoured him by making him a gentleman of his bed-chamber; presented him with a chain of gold, to which his portrait was affixed; and gave him the superintendance of his gallery of pictures, which contained works of the most distinguished masters of the Italian and Flemish schools. Of this gallery, Teniers made several pictures, in which he imitated the manners of the various masters so successfully, as to obtain the name of the Protens of painting. He also amused himself by making compositions in the styles of different painters of renown, as Titian, Tintoretto, the Bassans, Rubens, &c.; and in their execution endeavoured to imitate the touch of those great men. These imitations are generally known under the name of pasticcios, and have frequently been mistaken for originals, and sold as such.

These were the amusements or indulgencies of idle fancy; his fame rests for more full and honourable support upon his original productions in his own proper style. He was a constant and faithful observer of nature; and in his favourite subjects, village festivals, fairs, and merry-makings, he has exhibited, with a most engaging freedom, the manners and characters of his countrymen. That he might conveniently mingle with the scenes he chose to represent, he established himself in the village of Perk, between Antwerp and Mechlin, and there, with a painter's eye, he observed the undigested impulse of the natural character of the lower class among the people, and has left many beautiful and pleasing remembrances of occurrences uninteresting, nay sometimes disgusting in themselves, but rendered engaging by his delightful mode of representing them. One peculiar charm there is to be found in the best pictures of Teniers, more perfectly obtained than in the works of other artists, and that is, the complete effect of atmosphere, silvery, pure, and natural; Claude de Lorraine himself does not surpass him; and this truth, though yielded on simple materials, in scenes flat and insipid in their forms, yet makes amends for their natural want of interest by its truth and simplicity.

In the interior of apartments, of the cottage, the cabaret, the guard-room, or chemist's laboratory, he is not less admirable by his clearness and precision than in his exteriors. He surpassed Ostade in his knowledge of perspective, and in his freedom, as much as he is excelled by the latter in truth.

of tone and completion of character. His pencil is exceedingly light and dexterous; and by continual practice upon the same system, he had acquired a promptness almost unparalleled. This freedom of execution enabled him to paint an immense number of pictures: it was not unusual for him to finish a picture in a day; and he used jocosely to observe, that to contain all the pictures he had painted, it would be necessary to have a gallery two leagues long. He not unfrequently assisted the landscape painters of his day, by putting figures into their pictures; and many works of Artois, Van Uden, Breughel, and many others, owe an increased value to this circumstance. His works are numerous in the collections of this country, and still bear very high prices. Teniers lived to the advanced age of eighty-four, and died at Brussels in 1694.

He had a younger brother named Abraham, who also painted the same kind of subjects in the same style, and from this circumstance his works are sometimes mistaken for those of David, though they are much inferior in taste and execution.

TENINE, in *Geography*, a town of South America, in the province of Tucuman; 20 miles S.W. of St. Yago del Estero.

TENIS, a lake of Russian Tartary, 60 miles in circumference. N. lat.  $53^{\circ} 20'$ . E. long.  $74^{\circ} 4'$ .

TENISON, THOMAS, in *Biography*, archbishop of Canterbury, was the son of the Rev. John Tenison, rector of Mundesley, in Norfolk, and born in the year 1636. He received his university education at Benet college, Cambridge, of which he became a fellow in 1662. Having officiated for some time as a tutor in his college, he was presented in 1665 to the cure of St. Andrew the Great in Cambridge, and continued his attention to his parochial duty during the plague. In 1667 he became chaplain to the earl of Manchester, and obtained a rectory at Huntingdonshire. His first publication appeared in 1670, and was entitled "The Creed of Mr. Hobbes examined, in a feigned Conference between him and a Student in Divinity." In 1674 he was chosen principal minister to the church of St. Peter's Mancroft, Norwich; and in 1678 he published a "Discourse of Idolatry," and in 1679 "Baconiana," or some pieces of the great lord Verulam, with a general account of his writings. As he was one of the royal chaplains in 1680, he graduated D.D., and was presented by the king to the vicarage of St. Martin's-in-the-Fields, London. As an antagonist to popery, the apprehension of which was then very prevalent, he wrote several works against it, and also against Socinianism; and whilst he was guarding the church against those whom he conceived to be its enemies, he acquired still greater honour by liberal benefactions to the poor, and by laying the foundation of an endowed school and public library, which he afterwards completed. He blended gravity with moderation to such a degree, as to command general esteem; and accordingly he was selected by the unfortunate duke of Monmouth to prepare him for his execution. He also conducted himself with so much prudence at court, that he is said to have had a personal interest even with James II. In the reign of William he avowed himself a friend to the dissenters and toleration; and after his promotion to the archdeaconry of London, he was appointed one of the commissioners for reviewing the Litany, with a view to the comprehension of the Separatists. He thus recommended himself to queen Mary, and by her interest he obtained the see of Lincoln, in 1691. Within three years he was unexpectedly advanced to the archiepiscopal see of Canterbury, more on account of his moderate and pacific principles, than for any pre-eminence to which he had at-

tained among men of letters or theologians. He attended queen Mary on her death-bed; and incurred the severe animadversions of the deprived bishop Ken, for not having reminded her majesty of her culpable want of duty to her father, by consenting to wear a crown which rightfully belonged to him. His conduct during the reign of king William was uniformly consistent with his principles, and both were so pleasing to his majesty, that he distinguished the prelate by many tokens of respect and confidence. In the reign of queen Anne, he was not, as we may naturally imagine, much regarded; more especially as he retained his just ideas of toleration, and resisted, though not without a share of obloquy, some of the high-church measures which were then countenanced. Nevertheless he displayed on various occasions his attachment to the established church, as well as his habitual bounty to the indigent. His last public act was the coronation of George I.; and afterwards sinking under the decay of advanced age, he closed his life at Lambeth, December 1715, in the seventy-ninth year of his age. As he left no issue, he bequeathed a considerable part of his property to charitable purposes. His character was uniformly respectable; and his conduct in difficult times was irreproachable and exemplary. Biog. Brit. Gen. Biog.

TENMENTALE, or TENMANTALE, in our *Ancient Customs*, originally signifies the number of ten men, which number, in the time of the English Saxons, was called a decennary; and ten decennaries made what we call an hundred.

These ten men were bound for each other to preferre the public peace; and if any of them was found guilty of a breach of it, the other nine were either to make satisfaction, or to bring the criminal before the king.

TENMENTALE was also used for a duty, or tribute, paid to the king, consisting of two shillings for each ploughland; probably thus called, because each person of the decennary was bound to see it paid.

TENNA, in *Geography*, a river which rises in the Apennines, and crossing the marquisate of Ancona, runs into the Adriatic, about 4 miles E.N.E. of Fermo.

TENNE, TENNY, or *Tawney*, in *Heraldry*, a bright colour, made of red and yellow mixed; sometimes also called *brusk*, and expressed in engraving by diagonal lines drawn from the dexter to the sinister side of the shield, traversed by perpendicular lines from the chief; and marked with the letter T.

In the coats of all below the degree of nobles, it is called *tenny*; but, in those of nobles, it is called *hyacinth*; and, in princes' coats, the *dragon's head*.

TENNEAH, in *Geography*, a town of Bengal; 35 miles N. of Midnapour.

TENNEBERG, a mountain of Saxony, in the principality of Gotha; 4 miles S.W. of Gotha.

TENNELIERES, a town of France, in the department of the Aube; 4 miles E. of Troyes.

TENNESSEE, one of the United States of America, situated between  $35^{\circ}$  and  $36^{\circ} 30'$  N. lat., and  $4^{\circ} 26'$  and  $13^{\circ} 5'$  W. long. from Washington. It is bounded on the north by Kentucky and part of Virginia, on the south by Georgia and the Mississippi territory, on the east by North Carolina, and on the west by Missouri territory. Its extent from north to south is 102 miles, and from east to west 420 miles. Its area is 40,000 square miles, or 25,600,000 acres. The Indian claim has been extinguished in two portions of this country, the eastern and the western, comprehending one-third part of the state. The former is bounded north by Virginia, from the south-east corner of Kentucky, to the north-west of North Carolina; easterly by North Carolina;

# TENNESSEE.

Carolina; westerly by Cumberland mountain, Emery's river, &c.; and southerly by a line marked from place to place, as a continuation of the Cherokee boundary. The western tract, thus purchased of the Indians, lies on Cumberland river, and is bounded north by Kentucky; easterly by a line running from the north-east to the south-west; and south and west by a line of several thousand angles, run according to the Tennessee Ridge, which separates the waters of the Cumberland from those of the Tennessee river. The general course of this ridge-line is first westerly, and then north-westerly; which, imagining the zigzag reduced into two straight lines, makes the figure of the tract a trapezium. The longest side is that adjoining Kentucky, the length of which, ascertained by measurement, is nearly 160 miles. The length of the easterly side is about 90 miles. The eastern is generally called the Holston settlement, and the western the Cumberland settlement, from those two prime rivers, which traverse the countries respectively. Between these settlements lies a spacious wilderness, which the Cherokees claim and traverse in hunting, and which, from one limit of their claim to the other, as the road goes, is about 70 miles wide.

This state, as it was erected and organized in 1796, is divided into three districts. The eastern settlement is divided into two districts, Washington the eastern district, and Hamilton the middle district. The western settlement is the third or Mero district. The number of counties, &c. may be seen in the following topographical table.

<i>East Tennessee.</i>		
Counties.	No. Inhabitants.	Chief Towns.
Anderfon - - -	3959	
Bledsoe - - -	8839	Maryville.
Blount - - -	3259	Maryville.
Campbell - - -	2668	
Carter - - -	4190	Elizabethtown.
Claiborne - - -	4798	Tazewell.
Cocke - - -	5154	Newport.
Granger - - -	6397	Rutledge.
Greene - - -	9713	Greenville.
Hawkins - - -	7643	Roger'sville.
Jefferson - - -	7309	Dandridge.
Knox - - -	10171	Knoxville.
Rhea - - -	2504	Washington.
Roano - - -	5581	Kingston.
Sevier - - -	4595	Sevierville.
Sullivan - - -	6847	Blountsville.
Washington - - -	7740	Jonesborough.
	<hr/> 101367 <hr/>	

<i>West Tennessee.</i>		
Bedford - - -	8242	Shelbyville.
Davidson - - -	15608	Nashville.
Dickson - - -	4516	
Franklin - - -	5730	Winchester.
Giles - - -	4546	Pulaski.
Hickman - - -	2583	
Humphrey - - -	1511	
Jackfon - - -	5401	Williamson.
Lincoln - - -	6104	Fayetteville.
Montgomery - - -	8021	Clarke'sville.
Maury - - -	10359	Columbia.
Overton - - -	5643	Monroe.

Carry forward - 78264

Brought forward -	78264	
Robertson - - -	7270	Springfield.
Rutherford - - -	10265	Jefferson.
Summer - - -	13792	Gallatin.
Smith - - -	11649	Dixon's Springs
Stuart - - -	4262	
Wilson - - -	11952	Lebanon.
Williamson - - -	13153	Franklin.
White - - -	4028	Sparta.
Warren - - -	5725	M <sup>o</sup> Minville.
	<hr/> 160360 <hr/>	

The following counties have been laid out since the last census was taken:

Greenville,  
Wayne.

The eastern part of this state is mountainous, the middle part hilly, and the western part mostly level. The climate among the mountains is said to be delightful; in the middle part, temperate and agreeable; in the western part, hot in summer, and mild in winter. The diseases to which the adult inhabitants have been most liable are pleurisy, rheumatism, and rarely agues and fevers; but, upon the whole, the inhabitants are generally healthy, and this salubrity of the state has been partly attributed to its having few stagnant waters. The principal rivers of this state are the Cumberland, the Holston or Holston, the Tennessee, the Clinch, the Notachuckey or Nolichucky, the French Broad, the Hiwassee, the Duck, the Redfoot, the Obian or Oby, the Forked Deer, and the Wolf. The chief of these rivers are described under their appropriate names. The mountains in this state are numerous; some of them, particularly the *Cumberland* (which see), or Great Laurel Ridge, are the most stupendous piles in the United States. Stone, Yellow, Iron, Bald, Smoky, and Unaka mountains adjoin each other, and form, in a direction nearly north-east and south-west, the eastern boundary of the state. In these mountains are innumerable caverns and cascades. North-west from these, and separated from each other by vallies from 5 to 15 miles wide, rise Bay's mountain, Copper Ridge, Clinch mountain, Powell's mountain, and Welling's Ridge. The four last terminate north of the Tennessee river, and these, as well as the others, are branches of Virginia mountains. They are all encircled by vallies, which open channels for rivers and roads for passage. Although the soil on the mountains is poor, that of the vallies is fertile; improving in the middle of the state, and in the western part becoming rich. It produces cotton, which is the staple commodity, and the principal article of export, tobacco, indigo, Indian corn, hemp, flax, rice, wheat, rye, oats, barley, and all kinds of vegetables in high perfection. The trees and plants found in this state are poplar, hickory, black and white walnut, all kinds of oaks, buck-eye, beech, sycamore, black and honey locust, ash, hornbeam, elm, mulberry, cherry, dogwood, sassafras, papaw, cucumber-tree, coffee-tree, and the sugar-tree. In the eastern district is a species of pitch-pine, useful for boards, timber, and tar. The under-growth, in many places, and especially in low grounds, is cane, some of which is upwards of 20 feet high, and so thick as to prevent any other plant growing: there are also Virginia and Seneca snake-root, ginseng, Carolina pink, angelica, fenna, lobelia, Indian physic, spice-wood, wild plum, crab-apple, haws, hazel-nuts, sweet anise, red bud ginger, spikenard, wild hop and grape vines. The glades are covered with wild rye, wild oats, clover, buffalo-grass,

grafs, strawberries, and pea vines. On the hills, at the heads of rivers, and in some high cliffs of Cumberland, are found majestic red cedars; many of these trees are four feet in diameter, and forty feet clear of limbs. The commerce of this state is much facilitated by the rivers Tennessee and Cumberland, and their respective branches. Both these rivers empty into the Ohio, shortly after they pass the north boundary of the state. As the waters of the Cumberland from Nashville, and of the Tennessee from the Muscle Shoals to the Ohio, are navigable to the Ohio and Mississippi, the people of course, who live in this or the adjacent country, have the same advantages of water conveyance for trade, as those who live on the Ohio or Mississippi, to New Orleans or elsewhere. Besides, there is another probable avenue through which trade will be carried on with this and the adjacent country, which is from Mobile, up the waters of the Mobile river as far as it is navigable; thence by a land carriage, of about 50 miles at most, to Ocochappo creek, which empties into the Tennessee at the lower end of the Muscle shoals. The mouth of this creek is the centre of a piece of ground, the diameter of which is five miles, ceded by the southern Indians at the treaty of Hopewell, on Keowee, to the United States, for the establishment of trading posts. The iron works of Tennessee are large and numerous. The minerals of this country are iron-ore, limestone, coal, copperas, alum, nitre, lead, and some silver. Mineral springs, strongly impregnated with sulphur, are found in various parts of the country. On the waters of French Broad river is a fine, large, clear, medicinal, warm spring, the beneficial effects of which have been experienced by many persons who have resorted to it from the Carolinas, Georgia, and northern parts of Virginia. Salt is manufactured in considerable quantity, particularly on the north fork of Holston. Some herds of the bison are still found on the branches of the Cumberland river, though multitudes of them have been wantonly destroyed. The stag is occasionally found among the mountains; deer are scarce; bears, panthers, wild cats, and wolves, still remain. Beavers, musk-rats, and otters, are plentiful in the upper branches of Cumberland and Kentucky rivers. Racoons, foxes, opossums, and squirrels abound; as do also pheasants, partridges, pigeons, swans, wild turkeys, ducks, and geese; as well as bald eagles, parroquets, loons, cranes, and buzzards. The rivers are well stocked with all kinds of fresh-water fish.

The chief towns of Tennessee are *Knoxville*, *Nashville*, and *Jonesborough*; which see respectively.

The prevailing denomination of Christians in this state is composed of Presbyterians, intermixed with Baptists, Methodists, and Friends. With a view to mental and moral improvement, several schools and colleges are established in this state. Three colleges are established, one in Knox, one in Washington, and one in Greene county.

By the constitution of this state, which was formed and ratified at Knoxville, February 6, 1796, the legislative authority is vested in a general assembly, consisting of a senate and house of representatives. The number of representatives is to be fixed once in seven years, by the legislature, according to the number of taxable inhabitants, who are to be numbered septennially; the number of representatives not to exceed twenty-six, until the taxable inhabitants shall be 40,000. The senators are never to be less than one third, nor more than one half the number of the representatives, and are to be chosen upon principles similar to those for the choice of representatives. The election for members of both houses is biennial. The executive power of the state is vested in a governor, chosen by the electors of the members of the legislature: he is appointed biennially, and is

commander-in-chief of the army and navy, except in the service of the United States. Every freeman of 21 years of age, possessing a freehold in the county, and having been an inhabitant of the state for six months preceding, may vote for the members of the legislature. The house of representatives has the sole power of impeaching, and the senate of trying impeachments. The judicial power is vested in courts of law and equity. County officers are sheriffs, coroners, trustees, and constables. Military officers are to be elected by persons subject to military duty. Ministers of the gospel are not eligible to a seat in the legislature. No person who denies the existence of God, or a future state, can hold any civil office. The oath of allegiance and of office is to be taken by persons holding any office of trust or profit.

In the character of the inhabitants there is nothing peculiarly discriminating; but, in general, a great simplicity of manners prevails. Among the curiosities of the country we may reckon its numerous caves; and on the Enchanted mountain there are on several rocks impressions resembling the tracks of turkeys, bears, horses, and human beings, the latter having uniformly six toes each. Besides these, there are many other fanciful figures. The Indian tribes within and in the vicinity of this state are the *Cherokees* and *Chickasaws*; which see respectively.

The country now called Tennessee was included in the second charter granted by king Charles II. to the proprietors of Carolina; and in a subsequent division, it constituted a part of North Carolina. In 1754, at the commencement of the French war, not more than fifty families had settled here, who were either destroyed, or driven away by the Indians before the close of the following year. It remained uninhabited till 1765, when the settlement of it commenced; and in 1773, (such was the rapid accession of emigrants,) the country as far westward as the long island of Holston, an extent of more than 120 miles in length from east to west, was well peopled. In 1789, after some preparatory measures, the territory was ceded by the North Carolina legislature, on certain conditions, to the United States. In 1790, February 25, congress passed an act, accepting this cession; and, by another act, passed May 26, 1790, provided for its government under the title of "The Territory of the United States of America south of the River Ohio." On the 8th of June following, the president of the United States, by and with the advice and consent of the senate, appointed the Hon. William Blount, esq. a citizen of North Carolina, governor in and over the said territory; in which office he continued during the territorial government, and was president of the convention that formed the constitution under the title of "The Constitution of the State of Tennessee," of which we have given an abstract. The peace of the citizens of this territory has been disturbed many years past, by Indian wars, or incursions from the savages for the purposes of murder and plunder: they are now at peace. In the year 1796, this territory was in due form erected into an independent state, making the sixteenth in the Union. Morse. Melish.

*TENNESSEE Ridge*, the most considerable range of mountains in the state of Tennessee, separating the streams which run to the Cumberland and Tennessee rivers. In some parts it rises into abrupt hills, but in others admits of good roads. See *CUMBERLAND Mountain*.

*TENNESSEE*, called by the French *Cherokee*, and absurdly by others the *Hogohege* river, is the largest branch of the Ohio: it is 600 yards wide at its mouth. It rises in the mountains of Virginia, N. lat. 37°; and pursues a course of about 1000 miles south and south-west, nearly to

N. lat. 34°, receiving from both sides a number of large tributary streams. It then wheels about to the north, in a circuitous course, and mingles with the Ohio, nearly 60 miles from its mouth. From its entrance into the Ohio to the Muscle shoals, 250 miles, the current is very gentle, and the river deep enough, at all seasons, for the largest row boats. The Muscle shoals are about 20 miles in length. The bed of the river in this distance consists of broken stones, easily removed; and the navigation will admit of much improvement. At these shoals the river spreads to the width of three miles, and forms a number of islands, and is of difficult passage, except when there is a swell in the river. From this place to the "Whirl," or "Suck," where the river breaks through the Great Ridge, or Cumberland mountain, is 250 miles, the navigation all the way excellent. The Whirl, as it is called, is in about N. lat. 35°. It is reckoned a greater curiosity than the bursting of the Patowmack through the Blue Ridge. The river, which a few miles above is half a mile wide, is here compressed to the width of about 70 yards. Just as it enters the mountain, a large rock projects from the northern shore, in an oblique direction, which renders the bed of the river still narrower, and causes a sudden bend: the water of the river is of course thrown with great rapidity against the southern shore, whence it rebounds around the point of the rock, and produces the whirl, which is about 80 yards in circumference. Boats pass the whirl without danger or difficulty. Such is the situation of the shore, that boats ascending the river may be towed up. In less than a mile below the whirl, the river spreads into its common width, and except the Muscle shoals, already mentioned, flows beautiful and placid, till it mingles with the Ohio. Six miles above the whirl are the Chiccamogga towns, on the banks of the river, and of a large creek of the same name.

TENNIS, a pastime, or well-known game at ball, introduced among our ancestors about the year 1222, the sixth year of Henry III., by persons of superior rank and family, who erected courts or oblong edifices for the performance of this exercise. Some have ascribed the etymology of the word *tennis* to the French language, and accordingly have derived the game from France. But the word *tenez* does not afford sufficient evidence of its French origin. For the holding or keeping possession of the ball is no part of the game; for, during the play, the ball is in continual motion, or passing from one to another. Others seek the etymology of the name and the origin of the game in a place in France called Tennois, (or, by a change of one letter, Sennois, in the district of Champagne,) where balls were first made, and the game, as it is said, first introduced.

TENNIS, in *Geography*, the ruins of a town of Egypt, situated on an island in a lake of the same name; once a large city, built by the Romans, on the site of a more ancient Egyptian town; 28 miles S.E. of Damietta. N. lat. 31° 2'. E. long. 32° 14'.

TENNIS, a lake of Egypt, 55 miles long, and about seven wide, which reaches from Damietta to Tinch, separated only by a narrow tongue from the Mediterranean.

TENNIS, or *Tunis*, a sea-port of Algiers, in the province of Tremecen, at the mouth of a river which runs into the Mediterranean opposite a small island. Some geographers suppose this to be the ancient Jol, or Julia Cæsarea. Before the Turkish conquests, it was the metropolis of one of the petty royalties of this country; though a few miserable hovels are all that remains of it at present. Tennis has been long famous for the many loads of corn that are shipped off from thence to Christendom; but the anchoring ground (for

a harbour it cannot be called) that lies before it, being too much exposed to the north and west winds, is the occasion that vessels are frequently cast away, unless they meet with calm weather. The Moors have a tradition, that the Tennesians were formerly in such reputation for sorcery and witchcraft, that Pharaoh sent for the wisest amongst them to dispute miracles with Moses. It is certain that they are the greatest cheats in this country, and are to be as little trusted to as their road; 24 miles W. of Shershell. N. lat. 36° 33'. E. long. 1° 10'.

TENNOLTEI, a town of Thibet; 63 miles N.E. of Harachar Hotun.

TENO, a river of Norway, which runs into the sea, 56 miles W.N.W. of Wardhuys.

TENON, in *Building*, &c. the square end of a piece of wood, or metal, diminished by one-third of its thickness, to be received into a hole in another piece, called the *mortise*, for the jointing or fastening the two together.

Among joiners, &c. the tenon is made in various forms, square, dove-tailed, for double mortises, &c.

Vitruvius calls the tenons, *cardines*; dove-tailed tenons he calls *subscudes*, or *securiculæ*.

TENON-SAW. See *SAW*.

TENOR, TENOUR, the purport or contents, or transcript, of a writing, or instrument in law, &c.

Warrants issued for the confirmation of sentences, express, that they shall be executed according to their form and tenor. —It was impossible to retain so long a speech word for word, but the substance, or the tenor, is this.

TENOR, *Tenore*, Ital., in *Vocal Music*, implies the natural pitch or *tenour* of a man's voice in singing. In the vocal music of Italy, France, and Germany, there are three several tenor clefs in use at present: the *soprano* on the first line, for the highest part; the *contralto* on the third line, for the counter-tenor part; and the *alto tenore* on the fourth line, for the tenor part. (See *CLEF*.) In old music of the 15th, 16th, and 17th centuries, a tenor clef, called the *mezzo soprano*, on the second line, and even on the fifth line, frequently occurs, instead of the *baritono*, or F clef, on the third line.

In instrumental music, the tenor clef on the third line is used for the *alto viola*, and simply *viola*, or tenor part. The tenor clef on the fourth line frequently occurs in violoncello parts and harpsichord lessons of the early part of the last century; but at present, the high notes in the violoncello part, and in the base of pieces for the piano forte, are more frequently written in the treble clef.

TENOR, or *Tenorista*, is also used for a person who sings the tenor part in concert; and also for an instrument proper to play it.

TENORE *Indictamenti mittendo*, in *Law*, is a writ by which the record of an indictment, and the process thereupon, are called out of another court into the king's bench.

TENOS, in *Ancient Geography*, one of the islands called Cyclades, S.E. of the island of Andros, and very near it, N.W. of Delos, and N.E. of Syros. All historians agree in reporting that this island abounded with serpents, whence it took the name of Ophiussa, and in Greece that of the viper, or Tænia. It is said that the inhabitants must have abandoned it on this account, if Neptune had not refused it from them. In consequence of this deliverance, they erected a magnificent temple to his honour, in a wood near the town of Tenos, and here they celebrated feasts in commemoration of him. This temple had very extensive rights of asylum, which were afterwards regulated by Tiberius. The island was also called Hydrassa, on account of its waters. The town of the same name was situated near the sea, in the S.W.

S.W. part of the island. See TINO.—Also, a town of Greece, in Thessaly.

TENOUR. See TENOR.

TENSA, in *Geography*, a river of Louisiana, which forms with the Washita and bayou Long, an island of an oval shape, about 50 miles in circumference. Immediately above this island, there is another, called Sicilly island, about 30 miles in circumference. At the lower end of Sicilly island, the bayou Tenfa spreads into a lake of 15 or 20 miles in length, and nearly parallel with the Mississippi. The Tenfa lake receives two considerable streams, the river Aux Boeufs, and the bayou Masçon.

TENSE, TIME, in *Grammar*, an inflexion of verbs, by which they are made to signify, or distinguish, the circumstance of time of the thing they affirm or attribute.

The affirmations made by verbs are different as to point of time; since we may affirm a thing *is*, or *was*, or *will be*: hence a necessity of a set of inflexions, to denote those several times; which inflexions our English grammarians call by a barbarous word, *tenses*; from the French *temps*: most other languages call them simply *times*.

There are but three simple tenses; the *present*, as, *I love*, *amo*; the *preter*, *preterite*, or *past*, as, *I have loved*, *amavi*; and the *future*, as, *I will love*, *amabo*.

But, in regard that in the preter tense one may either express the thing as just done or past, or indefinitely and barely that it was done: hence, in most languages, arise two kinds of preterite; the one *definitive*, marking the thing to be precisely done; as, *I have written*, *I have said*: and the other *indefinite*, or *aurist*, denoting a thing done indeterminately; as, *I wrote*, *I went*.

The *future* tense admits also of the same variety.

Besides the three simple tenses, others have been invented, called *compound* tenses; expressing the relation of the simple ones to each other.—The first expresses the relation of the *past* to the *present*, and is called the *preterimperfect* tense, because it does not mark the thing simply and properly, as done, but as imperfect, and present with respect to another thing past; as, *I was at supper when he entered*; *cum intravit, canabam*.

The second compound tense marks the time past doubly, and is therefore called the *plusquamperfect* tense; as, *I had supped*; *canaveram*.

The third compound tense denotes the future with respect to the past; as, *I shall have supped*; *canavero*.

The several tenses, or times, it is to be observed, are properly denoted in the Greek and Latin by particular inflexions; in the English, French, and other modern tongues, the auxiliary verbs *to be*, and *to have*, *être* and *avoir*, are called in. As to the Oriental languages, they have only two simple tenses, the *past* and *future*, without any distinctions of imperfect, more than perfect, &c.; but this renders those languages subject to abundance of ambiguities, from which others are free.

The ingenious Mr. Harris, in his *Hermes*, p. 119, &c. proposes the following theory of tenses. The tenses, he says, are used to mark present, past, and future time; either indefinitely, without reference to any beginning, middle, or end; or else definitely, in reference to such distinctions. If indefinitely, then we have three tenses, an *aurist* of the present, an *aurist* of the past, and an *aurist* of the future. If definitely, then we have three tenses to mark the beginnings of these three times; three to denote their middle; and three to denote their ends: in all, nine. The three first of these tenses he calls the *inceptive present*, the *inceptive past*, and the *inceptive future*. The three next, the *middle present*, the *middle past*, and the *middle future*. And the three last, the

*completive present*, the *completive past*, and the *completive future*. Thus the tenses in their natural number appear to be twelve; three to denote time absolute, and nine to denote it under its respective distinctions. The following examples will illustrate the application and use of each tense. *Aurist* of the present, γράφω, *scribo*, *I write*; *aurist* of the past, ἔγραφα, *scripsi*, *I wrote*; *aurist* of the future, γράψω, *scribam*, *I shall write*. *Inceptive present*, μέλλω γράφειν, *scripturus sum*, *I am going to write*; *middle* or *extended present*, συγγράμω γράφων, *scribo*, or *scribens sum*, *I am writing*; *completive present*, γέγραφα, *scripsi*, *I have written*. *Inceptive past*, ἔμειλλον γράφειν, *scripturus eram*, *I was beginning to write*; *middle* or *extended past*, ἔγραφα, or ἐπιγράμω γράφων, *scribebam*, *I was writing*; *completive past*, ἐγγράφειν, *scripseram*, *I had done writing*. *Inceptive future*, μέλλω γράφειν, *scripturus ero*, *I shall be beginning to write*; *middle* or *extended future*, ἔσομαι γράφων, *scribens ero*, *I shall be writing*; *completive future*, γράψω, *scripsero*, *I shall have done writing*. The author has particularly shewn what traces are discoverable in favour of this system, either in languages themselves, or in those authors who have written upon this part of grammar, or in the nature and reason of things. Dr. Ward enumerates seven tenses; viz. the present, past, and future imperfect; the past indefinite; the present, past, and future imperfect. See his *Four Essays upon the English Language*, p. 84.

TENSIFT, in *Geography*. See TANSIFT.

TENSION, TENSIO, the state of a thing bent, or the effort made to bend it.

Animals only sustain and move themselves by the tension of their muscles and nerves. A chord or string gives an acuter or deeper sound, as it is in a greater or less degree of tension.

TENSION, *Tensio*, ΤΑΣΙΣ, in the *Ancient Music*, was used to signify any pitch of sound, whether produced by intension or remission. Vide *Aristoxen*. p. 10. 13. edit. Meibom.

Aristoxenus observes, there are five things to be considered about sounds, viz. τασίς, tension; ἐπιτασίς, intension; ἀνεσίς, remission; ὀξύτης, acumen; and βαρυτης, gravitas.

TENSITES, in *Geography*, a mountain of Africa, in the empire of Morocco, on the borders of Sugulmeffa; 60 miles E. of Morocco.

TENSOR, in *Anatomy*, a name given to different muscles.

Tensor *Palati*, a muscle of the soft palate. See DEGLUTITION.

Tensor *Tympani*, a muscle of the internal ear. See EAR.

Tensor *Vaginae femoris*; *musculus fasciae latae*; is an elongated and flattened muscle, narrow above, and becoming considerably broader below, situated at the upper and outer part of the thigh, and extending from the anterior superior spine of the ilium, to a short distance below the great trochanter. It is covered by a thin layer of the fascia; and it lies upon the rectus cruris, the vastus externus, and a small part of the gluteus medius and minimus, separated from them by a thin production of fascia, and by copious cellular tissue. Its front edge is parallel, above, with the outer margin of the sartorius: below, they are parted by an interval, occupied by the rectus anterior. The posterior edge is connected above to the gluteus medius; being separated from it below by cellular tissue. The upper extremity is attached to the anterior superior spine of the os innominatum, between the sartorius and the gluteus medius. The muscle, which is here narrow, passes obliquely downwards and outwards, growing considerably broader and thinner, and terminates below the great trochanter, at the angle of separation of the two layers of the fascia, between which it is situated: this angle is its point,

point of infertion. Its upper attachment is by means of a tendon, from which the fibres run to the fascia.

It will bend the thigh on the pelvis; or carry it outwards; or rotate it inwards. When the thigh is fixed, it will incline the pelvis on that limb.

TENSTADT, in *Geography*, a town of Saxony, in Thuringia; 11 miles N.W. of Erfurt.

TENT, TABERNACLE, a pavilion, or portable lodge, under which to shelter, in the open field, from the injuries of the weather. See TABERNACLE.

The word is formed from the Latin, *tentorium*, of *tendo*, I stretch; in regard tents are usually made of canvas, stretched out, and sustained by poles, with cords and pegs.

Armies encamp under tents: these are made of canvas, and are of various sizes. A captain's tent and marquée is generally 10½ feet broad, 14 deep, and 9 high; those of the subalterns are a foot less; the major's and lieutenant-colonel's a foot larger; and the colonel's two feet larger. The subalterns of foot lie two in a tent, and those of the horse one. The tents of private men are 6½ feet square, and 5 feet high, and accommodate five foldiers. The tents for the horse are 7 feet broad, and 9 feet deep; they hold five men, and their horse-accoutrements.

TENTS, *Bell*, are so called from their resemblance to a bell, and serve to shelter the fire-arms from rain.

To pitch the tents, is to fix them up ready for habitation, by the assistance of a ridge-pole, two standards, and a number of tent-pins.

Most of the Tartars and Arabs are wandering people, that always lodge under tents.

The Hebrews lodged forty years under tents in the deserts; which gave occasion to the Scenopægia, or feast of tabernacles.

TENT, *Dark*. See DARK.

TENT, in *Surgery*, signifies a roll of lint or linen, for preventing the healing of openings, from which matter, or some other fluid, makes its escape. Tents are also employed for dilating openings. There are some tents which are made of sponge that has been compressed into as small a compass as possible, while filled with fluid wax, and then allowed to become cold. These are called *sponge-tents*, and, on becoming warm, after being introduced into parts, they have the property of swelling in a remarkable degree. We shall only say further upon this subject, that, upon the whole, tents are not so much employed in modern as in ancient practice; and there is no doubt, that, unless their use be guided by moderation and judgment, they may do considerable mischief.

TENTAMOODY, in *Geography*, a town of Hindoostan, in the circar of Rajamundry; 35 miles S.E. of Rajamundry.

TENTATIVE is sometimes used adjectively: thus we say, a tentative *method*, meaning a kind of unartful or indirect method, which only proceeds by trying.

TENTATIVE is also used substantively, for an essay or effort, by which we try our strength, or found an affair, &c. to see whether or no it will succeed.

In the French universities, tentative is the first thesis, or act, which a student in the theology-school holds, to shew his capacity: if he answers well in this, the degree of bachelor is conferred on him.

TEN-TCHEOU-FOU, or TEN-CHOO-FOO, in *Geography*, a city of China, of the first class, in the province of Chang-tong, having under its jurisdiction one city of the second class, and seven of the third. It is situated on a rising ground, and fortified by a strong wall round it, and defended by a numerous garrison. The fortifications of this city include a large space not occupied by buildings; and

when it was laid out, it must either have been expected that it would increase in houses to a greater number than that of those who now occupy it, or the vacant space was allotted for military or other exercises. The bay, or rather road, of Ten-choo-foo, is not only open to the east and west, but partially sheltered towards the north by groups of small islands, scattered about at different distances, from five miles to twice as many leagues, off the main shore. The Mi-a-tau islands are too distant to break off much of either wind or swell from that quarter. The anchoring ground consists in great part of hard sharp rocks; and at about 1¼ mile from the shore is a dangerous reef, covered at high water, extending nearly a mile east and west, round which the water shoals so suddenly as to render any approach to it very perilous. At Ten-choo-foo is constructed a kind of dock, or basin, for vessels to load or discharge their cargoes. The entrance into it is between two piers, and is from 30 to 40 feet wide. The ground near the coast of the Yellow sea is richly cultivated, and rises in a gentle ascent, which is terminated by high, broken, and barren mountains, apparently granitic. The passage between Ten-choo-foo and the Mi-a-tau islands is called in the chart the strait of Mi-a-tau, in which strait the rise and fall of the tide are about seven feet. Staunton's Embassy, &c. vol. i.

TENTER, TRIER, or Prover, a machine used in the cloth manufactory, to stretch out the pieces of cloth, stuff, &c. or only to make them even, and set them square.

It is usually about four feet and a half high, and, for length, exceeds that of the longest piece of cloth. It consists of several long, square pieces of wood, placed like those which form the barriers of a manege; so, however, as that the lower cross-pieces of wood may be raised or lowered, as is found requisite, to be fixed at any height, by means of pins. Along the cross-pieces, both the upper and under one, are hooked nails, called *tenter-hooks*, driven in from space to space.

To put a Piece of Cloth on the Tenter.—While the piece is yet quite wet, one end is fastened to one of the ends of the tenter; then it is pulled by force of arms towards the other end, to bring it to the length required: that other end being fastened, the upper lift is hooked on to the upper cross-piece, and the lowest lift to the lowest cross-piece, which is afterwards lowered by force, till the piece have its desired breadth. Being thus well stretched, both as to length and breadth, they brush it with a stiff hair-brush, and thus let it dry. Then they take it off; and, till they wet it again, it will retain the length and breadth the tenter gave it.

TENTERDÉN, in *Geography*, is a small market-town in the hundred of the same name, in the lathe of Scray, and county of Kent, England, situated 18 miles S.S.E. from Maidstone, and 56 miles S.E. by S. from London. N. lat. 51° 4' 8". E. long. 0° 41' 8". At a remote period it was incorporated by the name of the "barons of the town and hundred of Tenterden;" which style was changed to that of the "bailiff and commonalty," by letters patent of Henry VI., who at the same time annexed it as a member to the town and port of Rye, in Suffex, to which it is yet subject. Queen Elizabeth, in her forty-second year, granted the inhabitants a new charter, by which, in the place of a bailiff, &c. the future government of the town was vested in a mayor, twelve jurats, twelve common-council men, a chamberlain, and a town-clerk. The present town-hall, which is occasionally used as an assembly-room, was built about the year 1792; the old one having been burned by an accidental fire. The market-house is a small, mean edifice of timber, now little frequented; the market itself being almost diffused, though still nominally

nominally held on Fridays. A large fair is annually held for the sale of cattle, wool, shop-goods, &c. According to the returns under the population act of the year 1811, the number of inhabitants in this town was 2786, that of houses 459. Many of the latter are respectable buildings, occupied by persons whose families have derived affluence from the grazing business carried on in the neighbouring marshes. The parish church is a spacious structure, and consists of a nave, north aisle, and chancel, with a well-built and lofty tower at the west end, on which is sculptured the arms of St. Augustine's monastery, to which foundation this church was appropriated in 1259. Besides the church, here are two places of religious worship for dissenters of different denominations. Dr. Harris mentions an ancient free-school, founded here by one of the family of Heyman of Somerfield, and records some donations made for its support. The trustees are the mayor and jurats, who, according to Haisted, are so inattentive to the charity, that not any children are now educated on this foundation.

The chapelry of Small Hithe, in Tenterden parish, was formerly, according to traditional report, a very considerable place, but is now reduced to a few farm-houses and cottages. The chapel was licensed by archbishop Warham, in 1509, "on account of the badness of the roads, and the dangers which the inhabitants underwent in their way to the parish church, from the waters being out."—*Beauties of England and Wales*, vol. viii. Kent, by E. W. Brayley.

TENTH, in *English History*. See *LAND-Tax*.

Tenths are said to have been first granted under Henry II., who took advantage of the fashionable zeal for croisades to introduce this new taxation, in order to defray the expence of a pious expedition to Palestine, which he really or seemingly had projected against Saladine, emperor of the Saracens; whence it was originally denominated the Saladine tenth. But afterwards fifteenths were more usually granted than tenths.

TENTH, *Decima*. See *FIRST-Fruits*, and *TITHES*.

TENTHS, *Office of*, is kept in the Temple, under the direction of a receiver and his clerks.

TENTH, in *Music*, the octave above the third, and an octave below the seventeenth, or stop in the organ called the tierce. The tenth is a very pleasing consonance, but inferior in suavity to the third; for which reason the duets at the opera, since the principal first man's part has been performed by a tenor, have never given the audience that exquisite pleasure which they used to do, when sung by two sopranos.

TENTHREDO, in *Entomology*, a genus of the Hymenoptera order of insects, the characters of which are, that the mouth has a horny, arcuated mandible, within dentated; a straight jaw, obtuse at the apex; a cylindric, trifid lip, with four unequal filiform feelers; the wings flat, and tumid or slightly inflated; the piercers consisting of two ferrated, scarcely prominent laminae; and the scutellum with two distant granules.

The larvæ of this genus resemble those of the order Lepidoptera, or real caterpillars; but are distinguished from them by their more numerous feet, which are never fewer than sixteen, exclusive of the three first or thoracic pairs. When disturbed or handled, they usually roll themselves into a flat spiral. They feed, like the caterpillars of the lepidoptera, on the leaves of plants; and undergo their chrysalis state in a strong gummy case or envelopment, prepared in autumn, out of which, in the ensuing spring, emerges the complete insect. The tenthredines form a numerous genus, and are divided into tribes or sections, according to the form of the antennæ. Gmelin reckons 143 species.

N. B. The European species are marked with a star \*, and the English with a cross †.

## Species.

A. *Antennæ clavated.*

\* FEMORATA. Antennæ yellow; black body; hinder thighs largest; the larva green, with a blueish line on the back, and yellow at the sides.

\* MARGINATA. Antennæ yellowish at the apex; black body; the hinder segments of the abdomen white at the margin.

LUTEA. Antennæ yellow; segments of the abdomen mostly yellow. This insect proceeds from a large green larva, of a finely granulated surface, with a double row of black specks on each side, and a dusky dorsal line bounded on each by yellow. It feeds on various species of willow, alder, and beech. The parchment-like case in which it envelops itself in autumn is of a pale yellowish-brown colour; and the chrysalis, which is of a pale dusky or brownish cast, exhibits the limbs of the future fly, in size equal to a common wasp, and of a yellow colour, bound with black; the antennæ rather short, and strongly clavated.

AMERINÆ. Body cinereous; abdomen beneath red; white lip. This insect is somewhat smaller than the preceding; its caterpillar, like that of the former, is of a green colour, and of a finely roughened surface, powdered with numerous whitish specks. Feeds on the willow.

TRISTIS. Black, with yellow antennæ, and wings brown at the apex; green larva, with an azure line on the back, black and yellow fringed.

VITELLINÆ. Abdomen above black; sides red; hinder thighs dentated; larva greenish.

LUCORUM. Antennæ black; body villous black. Found on the beech and alder.

\* FASCIATA. Black; antennæ black; primary wings with a brown band.

\* SERICEA. Antennæ yellow; thorax black; abdomen brassy; larva green, with two yellow lines.

OBSCURA. Body smooth and black. Found in the groves of Sweden.

CONNATA. Black; abdomen with yellow bands. Found on the alder.

\* NITENS. Antennæ yellow; abdomen green-blueish, shining. Suggested to be a variety of the sericea.

B. *Antennæ exarticulate, the outer ones thicker.*

CLAVICORNIS. Black; abdomen yellow; apex black. Found in North America.

ANNULATA. Black; abdomen yellow; hinder tarsi black, annulated with white.

\* ENODIS. Antennæ smooth; body black-blueish; larva green, spotted with black, a rough lateral line yellow, sharp tail.

CILIARIS. Antennæ beneath ciliated; hinder legs white. Found in Germany.

\* USTULATA. Body black; abdomen blueish; legs pale. On the canine rose. Larva green, with two white lines; head testaceous; obscure band.

† CYANOCROCEA. Head and thorax bright-blue; abdomen saffron-coloured.

† ATBATA. Black; back, zone, and three arcs, yellow-greenish.

BICOLOR. Black-blue; abdomen and base of the wings yellow; wings with a black band. Found in Austria.

\* MELANOCYRA. Black; abdomen yellow; a small black line

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line on both sides of the anus; legs and soles yellow; wings with a black spot.

\* **TRICOLOR.** Head and thorax black; wings and feet brown; abdomen yellow.

\* **OCHROPUS.** Head, thorax, middle of the breast, and apex of the hinder legs, black; abdomen and feet yellow.

### C. *Antennæ pectinates.*

**CEPHALOTES.** Black; abdomen with four yellow zones or belts. Found in Germany.

† **DORSATA.** Whitish; head and back of the thorax and abdomen black.

### D. *Antennæ pennates.*

\* **PINI.** Antennæ lanceolate, and thorax subvillous; larva blueish, and yellow at the tail end.

**JUNIPERI.** Antennæ obtuse; thorax smooth; larva green, pointed with black.

### E. *Antennæ filiform, with from seven to nine Joints.*

**AMERICANA.** Thorax yellow; abdomen blue; wings black. Found in Surinam.

**COSTALIS.** Black, with the rib of the wings ferruginous. Found in Germany.

\* **LATERALIS.** Black; middle of the back red; sides white. Found on the flowers of Sweden.

† **ARCUATA.** Abdomen black; five arcs, with a band at the base and sides, yellow-greenish.

\* **RUSTICA.** Black; abdomen with three yellow belts, the hinder two interrupted; larva cinereous, with triangular brown spots on the back.

\* **SCOPHULARIÆ.** Antennæ yellow; abdomen with five yellow belts, the first more distant.

**ÆLIETIS.** Body black, with four ferruginous segments of the abdomen.

**GERMANICA.** Body black; thorax before and abdomen red. Found in the groves of Germany.

**PADI.** Black, with thighs and legs white.

**CYNIPIFORMIS.** Green-brassy; yellow feet; hinder thighs brassy.

**CERASI.** Body black; scutellum and feet yellow; larva gelatinous, black.

**SALICIS.** Body variegated. Found on the elder and willows.

**FLAVICORNIS.** Yellow; head and tail black. Found in Germany and Italy.

**LUTEICORNIS.** Black; with antennæ, mouth, base of the abdomen, and legs, yellow.

**MESOMELAS.** Abdomen yellowish; back black; arcs yellowish.

**PUNCTUM ALBUM.** Body black; abdomen at the sides white; hinder thighs red. Found in Germany.

† **BLANDA.** Black; abdomen in the middle red; hinder thighs with a white spot.

**QUADRIMACULATA.** Black; hinder feet red; two spots at the base white.

\* **RUFIPES.** Body black; abdomen with two yellow belts; feet red.

\* **CAMPESTRIS.** Body black; abdomen with an unequal yellow belt; antennæ and legs yellow.

\* **ATRA.** Body black; feet red.

\* **VIRIDIS.** Body green; abdomen above brown.

\* **OVATA.** Body black; thorax above red; larva greenish, sprinkled with a kind of white powder.

**ALNI.** Body black; head and thorax red.

\* **CÆRULESCENS.** Violet; abdomen yellow; wings with a brown spot.

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\* **PAVIDA.** Black; the abdomen with three segments, and feet ferruginous; larva green, sprinkled with white farina; head yellow.

\* **ROSÆ.** Black; abdomen yellow, and ridge of the primary wings black; larva yellow, pointed with black.

\* **BICINCTA.** Body black; belt of the abdomen, anus, mouth, and legs yellow.

**CINCTA.** Body black; the abdomen with a white belt; perhaps a variety of the former.

\* **LIVIDA.** Body black; antennæ before the apex white.

**ALBICORNIS.** Black; antennæ at the apex white; legs testaceous; wings at the apex brown. Found in Italy.

**GONOGRÆ.** Body black; knees testaceous. Found in Germany.

**NIGRA.** Whole body black. Found at Upsal.

\* **ÆTHIOPS.** Smooth, black; with the four fore-legs pale.

**RAPÆ.** Body black; belly, feet, and scutellum whitish.

**SEPTENTRIONALIS.** Feet posterior, compressed and dilated; larva gregarious, green, spotted with black; yellow apices.

**OPACA.** Black; thorax with a spot on both sides, red at the apex. Found in the gardens of Sweden.

**CARBONARIA.** Black, with a white mouth; fore-legs testaceous. Found in Germany.

\* **NASSATA.** Yellow; scutellum and point of the wings white.

\* **12-PUNCTATA.** Body black, with twelve white points.

**CAPRÆ.** Yellow; head, thorax, and abdomen above, black; wings with a yellow point.

**MORIO.** Black; with pale feet. Found in Germany.

**ANNULARIS.** Black, shining; antennæ white at the apex; legs ferruginous. In the gardens of Austria, perhaps a variety of the livida.

**FERRUGINEA.** Antennæ black, annulated with white; body ferruginous; thorax, breast, and vertex black. Found as the last.

**CRASSA.** Black; feet and double points under the scutellum elevated, red. In Austria and Carniola.

**ALBICINCTA.** Black; the belt at the base of the abdomen and legs with a ring milky. In Austria and France.

**VESPIFORMIS.** Antennæ yellow; all the segments of the abdomen with yellow margins. In Austria.

**SEMICINCTA.** Black; the belt of the abdomen broken behind, yellowish; the feet and abdomen beneath yellow. In Austria.

**VIENNENSIS.** Black; abdomen with five yellow belts; the base of the antennæ fulvous. In Vienna.

**RIBIS.** Black; legs and apophyses of hinder thighs white at the exterior side. In Austria.

**FULIGINOSA.** Black, with fuliginous wings. In Austria.

**DEALBATA.** Black; the abdomen on both sides marked with a white spot, hinder thighs clavated, yellowish. In Austria.

**ALNETI.** Yellow; abdomen above black. In Austria.

**HÆMATODES.** Black, thorax before on both sides red. In Austria.

**ERYTHROGONA.** Black; the apex of the thighs and base of the legs red. In Austria and France.

**FULVIVENTRIS.** Black; with red and deep yellow abdomen. Found in Austria and Carniola.

**FULVIVENIA.** Black; with the exterior margin of the wings fulvous, or deep yellow. Found at Vienna.

\* **SULPHURATA.** Black; antennæ subclavated; four fore-

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fore-feet sulphureous; the hinder soles with three intermediate white joints.

\* *FLAVEOLA*. Antennæ subclavated, black; base, mouth, sides, and five first segments of the abdomen and feet, yellow.

\* *ANNULATA*. Yellow; antennæ subclavated, black; apex of the thighs and soles annulated with black.

\* *RUBIGINOSA*. Black; antennæ subclavated, and base with feet yellow; third, fourth, and fifth segments of the abdomen ferruginous,

\* *SUBULATA*. Black; antennæ subulate at the apex; second to the fifth segments of the abdomen, as far as the hinder margin, legs and soles, yellow, and these annulated with black.

\* *MUCRONATA*. Black, with the seven-knotted antennæ and abdomen yellow; the last segments from the second to the fourth black; the apex of the wings brown.

\* *VARIA*. Black; mouth, scutellum, and scutellar spots, white; the hinder segments of the abdomen and feet ferruginous.

\* *SANGUINOLENTA*. Black; with the hinder feet sanguineous.

\* *DEALBATA*. Black; the three last joints of the antennæ and jaws white; legs and soles yellow.

\* *CANESCENS*. Grey-downy, brown, with grey wings.

\* *BIFASCIATA*. Brown, with black thorax; mouth, scutellum, and four spots at the scutellum, white; abdomen with two interrupted yellow bands; margin of the wings and feet yellow.

\* *BRACCATA*. Black, with red thighs; the base of the four hinder legs, and the three penultimate joints of the antennæ, white.

\* *RUFIPES*. Black; the base of the abdomen, with a spot on both sides, and jaws, white; four fore-legs red.

\* *MELANOLEUCA*. Black; mouth, thorax with a small line on both sides before the wings; a spot on the hinder thighs; legs, the sides of the abdomen from five to seven segments, and apex, white.

\* *MELANOCERA*. Black; mouth, four fore-feet, and base-flexure of the hinder thighs, yellow.

\* *LEUCOPUS*. Black; the base-flexures of the thighs white; four anterior legs without, and middle of the hinder, white.

\* *VARICORNIS*. Black, with red feet; fourth and fifth joints of the antennæ and hinder legs at their base, white.

\* *OBSCURA*. Brown; with the rib of the wings as far as the spot and feet testaceous.

\* *LIMBATA*. Black; the hinder margins of the segments of the abdomen white; feet reddish.

\* *EXALBIDA*. Black; with feelers and four legs obsoletely white.

\* *FERRUGINOSA*. Black; the antennæ ferruginous forwards; the base and anterior margin of the wings, the first and fifth segment of the abdomen, the legs and soles, white.

\* *ANGUSTA*. Black; body narrow and grey-downy.

\* *LUTESCENS*. Black; with the abdomen beneath and feet yellow-reddish.

\* *ALBIPES*. Black; with legs and soles white.

\* *FLAVIVENTRIS*. Black; mouth white; abdomen yellow; back and apex black; feet testaceous.

\* *PICEA*. Pitchy; anterior legs before, spot of the hinder thighs, and base, white; hinder feet red; the knees and soles black.

\* *FUSCIPES*. Black; feet red; posterior soles brown.

\* *BIMACULATA*. Pale; eyes, abdomen above the base, breast and two spots, black.

\* *LATA*. Broad, black; the posterior segments of the abdomen white, from the second to the fifth interrupted.

\* *ANNALICORNIS*. Pale, the antennæ spotted with black at the base; vertex of a branchy figure, eyes, and the conjugate points at the back of the thorax and abdomen, black.

\* *SCRIPTA*. Pitchy; mouth, and on the middle of the fore-part of the thorax the mark resembles V; the spot on both sides the scutellum white; two scutellar points white; feet, and under margin of the segments of the belly, yellow.

\* *LITERATA*. Black; segments of the abdomen from the second to the fifth in the back, ovated spot on both sides and margins white; anterior feet, and four hinder legs on the fore-part, white.

\* *MELANORHIZA*. Black, with yellow abdomen; the transverse spots of the back and anus black.

\* *GEMINATA*. Black, with geminated antennæ, and joints and legs pale.

\* *OCHROGUSTES*. Pitchy; with the abdomen beneath and feet yellow.

\* *RUFICAPILLA*. Head and thorax red; the posterior margin of the latter and eyes black; the abdomen and feet yellow.

\* *DUBIA*. Black; thorax before red; joints whitish.

\* *PALLESCENS*. Black; mouth and feet pale.

### F. *Antennæ fetaceous; many Joints.*

*ERYTHROCEPHALA*. Body cæruleous; head red.

\* *SYLVATICA*. Body black; feet and marks of the thorax yellow.

\* *NEMORALIS*. Body black; segments of the abdomen white at the side.

\* *CYNOBATI*. Body black; feet ferruginous, hinder annulated with white and black.

*SIGNATA*. Pale; thorax and three dorsal longitudinal spots black. Found in Germany.

*POPULI*. Black-blueish; mouth, feelers, and legs yellow.

*VAFRA*. Head black, variegated with white; feet testaceous. Found in Sweden.

*RETICULATA*. Wings varied with pale and brown, with elevated veins, white and reticulated. Found in Finland.

\* *BETULÆ*. Body red; thorax, anus, and eyes black; wings behind brown.

\* *FLAVA*. Yellow, with the spot on the wings ferruginous.

*HÆMORRHOIDALIS*. Black; with the anus and feet testaceous. In Germany.

† *NEMORUM*. Middle of the abdomen red; scutellum and point on the wings white.

*DEPRESSA*. Head and thorax black; marks yellow; abdomen and feet ferruginous. In Austria and France.

*LINEARIS*. Black; legs, and five bands of the filiform abdomen, yellow. In Austria.

*BIPUNCTATA*. Antennæ sub-fetaceous; nine joints black, and two points of the black scutellum white.

### G. *Of doubtful Order.*

*INTERCUS*. Black; with yellow feet and subclavated antennæ.

*RUMICIS*. Found on the dock.

*ULMI*. Found on the leaves of the wild elder.

*PRUNI*. Found on the plum-tree.

*LONICERÆ*. Brown, tomentose, shining, with subclavated antennæ, and subferruginous wings.

\* *POLYGONA*. Black; antennæ subclavated with eighteen knots;

knots; the hinder margin of the segments of the abdomen from the third to the fifth yellow-greenish; the thighs black; the face anterior at the apex and the legs yellow; the hinder at the apex black; the soles yellow; the linear abdomen compressed.

TENTOLI, in *Geography*, a town of the island of Celebes, near the north extremity, on the west coast, which gives name to a road. N. lat. 1°.

TENTORES, among the Romans, were persons appointed to hold the clothes of the charioteers that contended in the circus.

TENTUGAL, in *Geography*, a town of Portugal, in the province of Beira; 7 miles W.N.W. of Coimbra.

TENTYRA, or TENTYRIS, in *Ancient Geography*, a town of Egypt, and capital of a nome, which took the name of *Tentyrites*, according to Strabo, Pliny, Ptolemy, and Steph. Byz.

TENTZEL, WILLIAM-ERNEST, in *Biography*, a German antiquary and historian, was born, in 1659, at Greussen, in Thuringia, and finished his education at Wittemberg, directing the course of his studies to philosophy and the Oriental languages, and also to history, both sacred and profane. In 1685 he was appointed a teacher in the gymnasium at Gotha, and entrusted with the care of the duke's collection of antiquities and coins. In order to qualify himself for the more honourable discharge of his duties as historiographer to the house of Saxony of the Ernestine line, to which office he was appointed in 1696, he visited various courts in Germany, and carried on an epistolary correspondence with many distinguished foreigners. In 1702 he removed to Dresden, where he was made historiographer to the elector of Saxony, king of Poland, by whom he was honoured with the title of counsellor; but his manners not being adapted to a court, he obtained leave to retire. What remained of his life was devoted to literary pursuits; and he died, very poor, in November 1707, in his 49th year. His works were numerous, among which we may reckon the following: *viz.* "De Phenice," Vitemb. 1682, 4to.; "De Ritu Lectionum Sacrorum," Vitemb. 1685, 4to. a work highly commended by Bayle; "Judicia Eruditorum de Symbolo Athanasiano studiosè collecta et inter se collata," Francf. et Lipf. 1687, 12mo.; "Animadversiones in Casimiri Ordine Supplementum de Scriptoribus Ecclesiasticis," 1688, 12mo.; "Casparis Sagittarii Historici Saxonici Historia Gothona plenior, &c." Jena, 1700, 4to.; "Supplementum Historiæ Gothonæ," *ibid.* 1701, 4to.; "Supplementum Hist. Goth. secundum," *ibid.* 1701, 4to.; "Saxonia Numismatica, Pars I." Francf. et Lipf. 1705, 4to.; "Pars II." 1705. Tentzel was also a contributor to several literary journals. Gen. Biog.

TENUIROSTRÆ, in *Ornithology*, the name of a genus of small birds, which feed on insects, and have slender and sharp beaks; of this genus are the lark, swallow, red-breast, and a number of others. Ray's Ornithology.

TENUME, in *Geography*, a town of Arabia, in the province of Nedsjed; 40 miles N. of Aniza.

TENURE, in *Agriculture*, the manner in which proprietors and tenants hold their lands, &c. of their landlords, or other persons.

It may be noticed, that the tenures of lands are extremely various in almost every district of the kingdom, being, however, chiefly *freehold*, *free-farmhold*, *copyhold*, *long-leasehold*, or *life-leasehold*, though there are many other local sorts of tenures of land. The freehold is most probably in the largest proportion over the whole country, the copyholds in the next, and the leasehold tenures in the smallest extent. It

has been remarked in the Shropshire Agricultural Report, that it appears beautiful in theory, that there should be one rule of descent in a kingdom only, one tenure of property, and one scale of political rights; but that it may be doubted whether so much uniformity is suitable to an imperfect state; or at least to our present degree of improvement. At all events, irregularities that are not attended with much practical inconvenience, should not be pointed out as obnoxious, in a scheme that has produced so much positive happiness, and so much comparative good, as the constitution of these kingdoms has afforded.

It is stated too, in the Agricultural Survey of Essex, that freehold estates are the most valuable to the immediate proprietor, there can be no doubt; but the purchaser of a copyhold may remember, that the original purchase is by so much the lower; and whether he lets the occupation to a tenant, or farms and cultivates it himself, he may possibly make as good interest of his capital as if he had bought a freehold. Perhaps, also, its general and final utility to the public, may be nearly or quite the same. This, the writer thinks, is certain, that copyhold estates, whether in the hands of the proprietors or tenants, are as well cultivated as the free, excepting only in the article of timber, and even in that the difference is seldom visible. The like may be said of leasehold estates, and even of those in mortmain.

In Hertfordshire, where a large portion of the property is held by copyhold tenure, with a fine certain or at the will of the lord, but which fine never exceeds two years' rent, the land sells at about six years' purchase under the price of freehold, according to the Report of the state of agriculture for that district. And it is further suggested in the latter of the two former of the above agricultural surveys, that, with regard to the tenures by which the more temporary occupiers hold their farms, they are, as already observed, extremely various, some upon leases of longer or shorter duration, some without any lease at all, agreeably to the taste and pleasure of the landlord; though by far the greatest number, especially of those in the possession of the smaller proprietors, are let upon leases of from eight or ten to twenty-one years. And it is observed, from what has been done in Norfolk and other counties where the tenures are of more length, as from seven to twenty-one years, that the improvement of the land is much connected with the practice of such tenures. And it is likewise suggested in the Gloucester Report on Agriculture, that it were much to be wished that a general rule could be adopted for the commencement and end of tenures; as it would ultimately, the writer thinks, be highly advantageous to landlords and tenants, and will probably be one result of the labours of agricultural societies.

Some suppose the freehold tenure to possess the most numerous advantages, with the fewest inconveniences, of any sort of holding. But many are of opinion that some other kinds are equal to it, or nearly so. The forms of tenure throughout most of the southern parts of England, are principally those of the freehold, copyhold, life-lease, church-lease, and college-lease kinds, both for lives and years. In Cornwall they are for the most part freehold, with the exception of the lands of ecclesiastical corporations and ancient duchy land, which is equivalent to copyhold in fee, held under the duke of Cornwall, subject to a small annual rent. This sort of land passes by surrender in the duchy courts, nearly in the same form as other copyhold lands. But the modern duchy is different from the above; the occupiers being lessees under the duke, and, in general, are purchasers of an interest in the land during the continuance of the longest liver of three lives, the consideration being, in part,

a fine paid at the time of the grant, and also a reserved rent during the continuance of the lease.

There are three different kinds of church-lease in this district; as demises to tenants for the longest of three lives; the considerations being money and reserved rents; demises to manorial tenants for three lives in the same way; the takers having the liberty, during the whole time, to under-lease to other tenants in the manner of copyholds for three lives; and grants of leases for twenty-one years absolute, giving fresh leases at the end of every seven, which is a renewal of the first. These are first made in consideration of fines and reserved rents, but in the renewals fines only.

In the same district, it has been much the custom, in respect to the tenure of tenants, to grant leases for lives, for the term of ninety-nine years, determinable on the death of the longest liver of three lives, to be named by the taker. On the death of one of the lives named in the lease, it was usual for the landlords to consent to the adding a new life to the two which remained. The consideration in the primary grant was uniformly a fine in hand of from fourteen to eighteen years rent of the landed estate, with a small reserved rent, and suit and service to the manor court; the renewal commonly a fine only of three years' rent for one life, or seven for two lives, without any alteration of the other rent.

A large proportion of the lands here are now held by the tenantry under these leases or tenures, but it must be noticed, that the number of new grants, or the renewal of old ones, is on the decrease; and seldom takes place, unless under particular circumstances and motives.

The holders under these leases or tenures, which are called leaseholds or fine-leases, are constantly subjected to all taxes and repairs of every kind, excepting that a small portion of the land-tax in some manors is repaid the tenant, as the land-tax of the reserved rent. Under the property-tax, they were rated both as proprietor and occupier, except only that the landlord was liable to the property-tax for his reserved rent.

It admits of some doubt whether this mode of leasing or holding property be more detrimental to the lord, the tenant, or the public in general; but it is certainly a very injudicious and unwise method of proceeding, as it is highly injurious to the agriculture of the county, though at first sight the security and great length of the leases might be supposed to have the contrary effect. It is found, however, in practice, that the circumstance of most of the holders under these leases having not only exhausted in their purchase and renewal the whole of their capitals, but often considerably more raised on them with great disadvantage, counteracts every good that might otherwise have been expected. It is asserted that, in common, cultivators of this sort, from the want of capital and other means, as well as the speculative nature of all such tenures, are necessarily feeble and spiritless, and that they live worse, work harder, and are more inconvenienced, than any other kind of holders of land. And that where the landlords do not renew, they are frequently sufferers from the dilapidated and exhausted state of the premises.

It is also remarked by Mr. Vancouver, in his Account of the Agriculture of the County of Devon, in regard to these kinds of life-lease tenures, that the mischievous consequences inseparably connected with, and resulting from, the want of agricultural knowledge in those who have the direction and management of such estates, and who, to cover the want of the necessary qualifications of a land agent, most commonly advise the proprietors to grant those life-hold tenures so frequently heard of in this county and South Wales, are

more injurious and extensive than is generally apprehended. The same capital employed in the purchase of a lease for ninety-nine years, determinable on three lives, applied to the stocking, cultivating, and improving a more extensive occupation held at a fair annual rent, and under an encouraging term of years, must, it is supposed, produce, in the contemplation of such property, very different emotions in the mind of the owner: to the occupier the results are infinitely more advantageous; and to the public at large, a more abundant supply is produced than can possibly be derived from a capital employed in the purchase of a more narrow occupation on an eventually undisturbed possession of ninety-nine years. But notwithstanding, an opinion prevails with some noblemen and others in this county, that it is better to realize at forty years' purchase, than to suffer the lifehold tenures to fall in without renewal. Fortunately for the future improvement and prosperity of the county, the writer says, this species of tenure is become much lessened within the last twenty years. In order to accomplish this preposterous object of the tenant's indolence and pride, it is observed, he will employ his last shilling, and incur very heavy obligations among his friends and neighbours, to pay eighteen years' purchase for a lease only of that very farm, the fee of which might readily have been bought for about one-third more. Destitute of capital, and encumbered with obligations contracted with his family and friends, the farmer enters his new occupation, depending upon casual and agistment stock for the consumption of his pasture herbage. Having little or no reserved rent to provide for, the efforts of himself and family are directed to the annual cultivation of so much of his land as will pay the parochial and other small disbursements, and supply the bare wants of the most comfortable life it is possible to conceive, leaving no brighter prospects to his offspring, than what the lapse of ninety-nine years may do, by terminating a lease so injudiciously purchased. The same is the case with these sorts of tenures in many other districts of the kingdom.

There is a great number of tenures besides the above sorts in the midland and more northern counties, some of which are very curious and singular. Tenures under the crown are likewise met with in these as well as most other parts of the kingdom.

In that part of the country usually denominated Scotland, the tenures by which lands are principally held may be classed and considered as those of superiority, property, and tack; the first of which is merely nominal, and goes no farther than that of conferring the right of franchise; the second is a valuable tenure of land, as yielding and implying the full use and command of it to the subject for all the purposes of human life, excepting merely political power, which is attached as above, and may or may not be attached to the property; and the last is the tenure for a term of years, by which professional farmers hold land from proprietors for the purposes of agriculture. The origin of these sorts of tenures, which seem to have been of a military or feudal nature, is more fully explained in Finlatter's Agricultural Survey of the County of Peebles, to which the inquirer on this subject is referred.

TENURE, *Tenura*, in Law, the manner or condition in which a tenant holds lands or tenements of his lord; or the services performed to the lord, in consideration of the use and occupancy of his lands.

The kinds of service, and consequently of tenures, are almost infinite. See SERVICE.

Those for lands held of the king are either *great*, or *petty serjeanty*, *in capite*, *knight's service*, &c.

Those held of the lords were very various, *base*, *frank*, &c. by *homage*, *focage*, &c. See BASE, FRANK, &c.

The

The common tenures at this day are, fee-simple, fee-tail, by courtesy, in dower, for life, or for years, or by copy of court-roll.

TENURE, *Barons by ancient*. See BARON.

TENURE, *Disturbance of*, is a species of injury which consists in breaking that connection which subsists between the lord and his tenant, and to which the law pays so high a regard, that it will not suffer it to be wantonly dissolved by the act of a third person. If, therefore, there be a tenant at will of any lands or tenements, and a stranger, either by menaces or threats, or by unlawful distresses, or by fraud and circumvention, or other means, contrives to drive him away, or inveigle him to leave his tenancy, this the law very justly construes to be a wrong and injury to the lord; and gives him a reparation in damages against the offender by a special action on the case. Blackst. Com. vol. iii.

TENUTE, Ital. in *Musæ*, generally written *ten*, from the Italian verb *tenere*, to hold on, sustain to the last moment of a note's duration. See SOSTENUTO.

TENYA, in *Geography*, a town of Africa, in the country of Fouta. N. lat.  $10^{\circ} 15'$ . W. long.  $10^{\circ} 25'$ .

TEN-YANG, a town of Corea; 73 miles E.S.E. of King-ki-tao.

TENZEGZET, a town of Algiers; 16 miles S. of Tremecen.

TENZYN, a town of Poland, in the palatinate of Cracow; 20 miles W. of Cracow.

TEOATZINCO, a town of Mexico, in the country of Tlascala, where a bloody battle was fought between the natives and the Spaniards under Cortez; 20 miles E. of Tlascala.

TEOLO, a town of Italy, in the Paduan; 7 miles S.S.W. of Padua.

TEOLY, a town of Hindoostan, in the circar of Gohud; 15 miles S.E. of Gwalior.

TEOMAHAL, a small island in the Sooloo Archipelago. N. lat.  $6^{\circ} 15'$ . E. long.  $120^{\circ} 51'$ .

TEONA, a small island near the west coast of Scotland. N. lat.  $56^{\circ} 47'$ . W. long.  $5^{\circ} 50'$ .

TEOPISCAN, a town of Mexico, in the province of Chiapa; 60 miles S.E. of Chiapa dos Espagnols.

TEOS, in *Ancient Geography*, a town of Asia Minor, in Ionia, on the southern coast of a peninsula, which became an island when the sea was high or much agitated. It was situated over-against the isle of Samos, S.W. of Smyrna, and E. of the promontory of Coryceon. It is celebrated for having been the birth-place of Anacreon. The inhabitants were renowned for their courage; they preferred abandoning their city to living under the tyranny of the Persians. Teos was treated with mildness by the Roman emperors. Bacchus had a magnificent temple here, which Vitruvius has particularly described. Here also was held a general council for the management of all the affairs of Ionia, because this city was in the centre of Ionia.—Also, the name of a town of Scythia.

TEOWENISTA CREEK, in *Geography*, a river of Pennsylvania, which runs into the Alleghany, about 5 miles below Hickery.

TEPAPA. See TAROATAIHETOOMO.

TEPEACA, in *Geography*, a town of Mexico, in the province of Tlascala; 15 miles S.S.E. of Puebla de los Angeles.

TEPEGUANA, a district of New Brazil, situated on the Nazas.

TEPELLENE', a town of Albania, the birth-place and favourite residence of Ali, situated on the banks of a river, which at the distance of 60 miles from the sea appears

to be as broad as the Thames at Westminster bridge. The streets of the town, containing about 400 ill-built houses, are extremely dirty; but the palace of the vizier is very magnificent.

TEPE-MAXTLATON, in *Zoology*. See FELIS *Tigrina*.

TEPETISTAC, in *Geography*, a town of Mexico, in the province of Guadalajara; 60 miles N. of Guadalajara.

TEPETOTOTI, in *Ornithology*, the name of a Brazilian bird of the gallinaceous kind, more usually called *mituporanga*. See CRAX *Aleætor*.

TEPHLIS, or TELIHIS, in *Ancient Geography*, a town of Asia, in the vicinity of Media.

TEPHRIA, in the *Natural History of the Ancients*, a name given to the grey ophites.

TEPHRICA, in *Ancient Geography*, a town of Asia, in the neighbourhood of Cilicia and Armenia.

TEPHROMANTIA, *τεφρομανθία*, in *Antiquity*, a species of divination, performed with ashes; for which see Potter, *Archæol. Græc.* tom. i. p. 353.

TEPHROSIA, in *Botany*, from *τεφρος*, ash-coloured, in allusion probably to the hoary aspect of the herbage.—“*Perf. Syn.* v. 2. 329.” Pursh 489. (Erebinthus; Mitchell in *Ephem. Nat. Curios.* v. 8. 210?)—Clas and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, deeply divided into five straight, awl-shaped teeth; the upper ones rather the shortest; the lowest rather longer than the rest. *Cor.* papilionaceous. Standard recurved, large, roundish-ovate. Wings half-ovate, obtuse, straight, rather shorter than the standard. Keel broad, rounded, gibbous, compressed, the length of the wings. *Stam.* Filaments ten, all firmly united along the middle into a membranous tube; the tenth separate at the base, and in its upper half; all capillary and distinct at the extremity, somewhat unequal in length; anthers terminal, uniform, ovate-oblong. *Pist.* Germen sessile, oblong, compressed, very hairy; style awl-shaped, angular, ascending, hairy along the back; stigma simple, recurved, slightly hairy. *Peric.* Legume oblong, compressed, hairy, somewhat falcate or ascending, of two valves and one cell. *Seeds* several, compressed, kidney-shaped, rather angular, slightly separated from each other by thin, imperfect, membranous partitions.

Ess. Ch. Calyx with awl-shaped, nearly equal, teeth. Stamens all connected. Legume compressed, rather coriaceous, of one cell, with many seeds. Stigma acute.

Obs. We have taken our characters from one certain species, *T. virginiana*, comparing it with authentic original specimens of Mitchell's *Erebinthus*, which Linnæus thought the very same species, but in this he was certainly mistaken. It appears to be Mr. Pursh's third species, *T. hispidula*; and as far as we can judge, from specimens that will not admit of dissection, and from Mitchell's description, it is most probably of the same genus, for Mitchell might overlook the partial union of the stamens, even supposing that character to exist in his plant. If we were certain of this, his name ought, by every right, to be preferred to the more modern one of Pursh. (See EREBINTHUS.) The genus moreover is improperly placed in the sixth section of *Diadelphia*, while its essential character indicates that it belongs to the first.

1. *T. virginiana*. Virginian Grey-Vetch. Pursh n. 1. (*Galega virginiana*; Linn. Sp. Pl. 1062, excluding Hort. Cliff. and Mitchell's synonyms. Willd. Sp. Pl. v. 3. 1244. Ait. Hort. Kew. v. 4. 355. *Cicer astragaloides* (fortè) *virginianum*, *hirfutè pubescens*, *floribus amplis subrubentibus*; Pluk. Phyt. t. 23. f. 2.)—Erect, hoary, and

and shaggy. Leaflets numerous, oval-oblong. Cluster terminal, many-flowered.—In dry sandy woods, from Canada to Florida, flowering in June and July. *Root* perennial. *Plant* about a foot high. *Flowers* very handsome, rose-coloured and yellowish-white. *Pursh.* The *stem* is simple, leafy, angular, brown, clothed with hoary pubescence. *Leaves* alternate, nearly sessile, pinnate, of from 17 to 21, not quite opposite, entire leaflets, each about an inch long, hairy on both sides, tipped with a minute point. *Cluster* solitary, various in length, composed of numerous large flowers, not unlike those of a Lupine. *Calyx* densely hairy. *Legume* an inch and a half long, pointed, linear, hairy, somewhat undulated, and a little curved upward, tumid where the seeds are lodged. Miller appears to have cultivated this plant in 1765. We have never seen a living specimen. That we have here described was sent by Kalm to Linnæus. The *legumes* came from Jacquin's herbarium.

2. *T. chrysophylla.* Golden-leaved Grey-Vetch. *Pursh* n. 2. (*Galega villosa*; Michaux Boreal-Amer. v. 2. 67? *Pursh.*)—Prostrate, downy. Leaflets five, somewhat wedge-shaped, very obtuse. Flower-stalks opposite to the leaves. Legume nearly straight.—Gathered in Georgia by Mr. Entlen, flowering in July and August. Perennial. *Leaflets* wedgeshaped-obovate; smooth above; silky at the back. *Stalks* elongated, bearing about three purple flowers. The singular circumstance of the nearly sessile leaves gives it the appearance of a trifoliate plant, the lower pair of leaflets resembling *stipulas*. Michaux's synonym is rendered doubtful by his not mentioning the small number of leaflets, one of the most striking characters. *Pursh.*

3. *T. hispida.* Hispid Grey-Vetch. *Pursh* n. 3. (*Galega hispida*; Michaux Boreal-Amer. v. 2. 68. *G?* *spicata*; Walt. Carol. 188. Erebinthus; Mitch. as above. *Citoria*, n. 3; Linn. Hort. Cliff. 498, excluding the very erroneous reference to Burmann.)—Slender, diffuse, downy. Leaflets numerous, oblong-elliptical, abrupt, pointed. Flower-stalks opposite to the leaves. Legume falcate, hispid.—In pine woods and on slate hills, from Virginia to Georgia. Perennial, flowering from July to September. *Leaflets* 13 or 15. *Stalks* elongated, bearing from three to five pale-red flowers. *Pursh.* Every part of this description answers to the original specimens of Mitchell's plant, but he, as well as Linnæus, speaks of the tenth *flamen* as being really separate from the rest. We cannot from our specimens determine this point. The *stems* are long, branched, trailing, round, and hairy. *Leaflets* with strong oblique transverse veins; sometimes smooth above; always silky beneath; their length about an inch. *Braçtes* lanceolate. *Calyx* very bristly. Perhaps the union of the tenth *flamen* to the rest, which is not in the usual mode continued quite to the base, even in *T. virginiana*, may exist less, or not at all, in the species before us, and yet the plants may together constitute one natural genus.

TEPID, in *Natural History*, a term used by writers on mineral waters, to express such of them as have a less sensible cold than common water.

They distinguish all the medicinal springs into three kinds; the hot, the tepid, and the cold: but the middle term might easily be misunderstood to mean a great deal more than they express by it: all that have what can be called the least sensible warmth, are called *hot*; and the tepid are distinguished from the absolutely cold, only by their being less cold.

Some of this class of mineral waters, and some few also of the cold ones, have a sharpish vinous taste, which is never observed in any of the hot ones. This taste is lost on giving the waters the slightest heat, and is therefore very

difficult to be guessed at as to its origin. It is not only found in the aluminous and vitriolate waters, but also in those which are manifestly nitrous, and which abound in sulphureous salts, quite different in their nature from acids. It is therefore an additional somewhat, quite distinct from the saline properties of the fluid, and as easily connected with one kind of that as with the others.

The cause of heat in the mineral waters remains yet wholly unknown, notwithstanding all that has been written concerning it. It is hard to believe, that there are continual subterranean fires near enough the surface, to give a heat that preserves itself in so great a degree to the very place of their eruptions; and it is equally hard to conceive, that there can be beds of fermenting mineral matters, sufficient in quantity and force to have given the same degree of heat to waters for so many ages, as some of our hot springs are known to have subsisted. Duclos's Exam. des Eaux Miner.

TEPIDARIUM, among the Romans, a tepid or blood-warm bath, which was joined to the cold and hot baths, and was a medium between the two; so that if any person wanted to go from the hot to the cold bath, or *vice versa*, he always took the tepid bath in his way.

TEPIQUE, in *Geography*, a town of Mexico, in the province of Xalisco; 5 miles N. of Xalisco.

TEPIRU, a town of South America, in the province of Tucuman; 18 miles N.W. of St. Yago del Estero.

TEPKAS, a Russian settlement in North America, on the east side of Beering's strait. N. lat. 66°. E. long. 112° 4'.

TEPLITZ, a town of Bohemia, in the circle of Leitmeritz, celebrated for its warm baths, discovered in 762; 14 miles W.N.W. of Leitmeritz.—Also, a town of Croatia; 8 miles S. of Varadin.

TEPLOW, GREGORY NICOLAICUITSCH, in *Biography*, a Russian writer, educated in a seminary at Novogorod, where he distinguished himself by a Latin translation of prince Cantemir's Satires, and a work on the geography of Russia, neither of which was ever printed. In 1740 he was employed in the Academy of Sciences, and in forming a catalogue of objects contained in the Cabinet of Natural History. He thus acquired a taste for that science, and particularly for botany; in consequence of which he was made an adjunct of the Society in 1741, and in the following year delivered lectures on moral philosophy, that were much approved. The empress Elizabeth appointed him tutor and travelling companion to her favourite, count Rasumofsky, who, on his return from his travels in 1746, was made president of the Academy of Sciences. Teplov then became an honorary member, directed the institution in the name of the president, and drew up rules for its better regulation. At the time of the empress's death he was a counsellor of state; but as he was an enemy to Peter III., he was arrested: afterwards he was restored to favour; nevertheless, two months after his being made a member of the council of state, it was discovered that he had joined in a conspiracy to dethrone that unfortunate prince. After the deposition of Peter, he published manifestations, in order to render him odious, and, as Busching says, was the principal agent in putting him to death. For this service he is said to have received a reward of 20,000 rubles. The empress afterwards made him a privy-counsellor and member of the senate, and honoured him with the orders of Alexander Newsky and St. Ann. He died in March 1779; and his works, in the Russian language, are, "A General View of Philosophy;" "Instructions to his Son;" "A Collection of Songs, with Melodies for three Voices;" "Instructions for

for the Cultivation of foreign Tobacco, in Leffer Ruffia," distributed by order of the emperors through that province, in 1763. Gen. Biog.

TEPOTI, in *Geography*, a river of Paraguay, which runs into the Paraguay.

TEPPELWODA. See TOPPLISWODA.

TEPTERE, a name originally Tartarian, and signifying a man who cannot pay his taxes, given by the Russians to a peculiar tribe formed of Finns and Tartars in the middle of the 16th century, during the dissolution of the Khazan-Tartarian empire. They established themselves at first in that part of the Ural mountains, which belongs to the government of Ufa. At present they are so much intermingled, that their origin is scarcely discernible. They are found to increase in number at every succeeding census. In the year 1762, about 34,000 of them paid the imposts.

TEPTON, in *Geography*, a town of Thibet; 30 miles N.W. of Srigatchee.

TEPWIA, a town on the W. coast of the island of Celebes. S. lat.  $1^{\circ} 4'$ . E. long.  $119^{\circ} 10'$ .

TEQUENDAMA, a cataract near Bogota, the capital of New Granada (see BOGOTA), which, according to Bouguer, is one of the highest in the world, being 200 or 300 fathoms in height, and its fall vertical. Its real height is probably about 1320 feet. The river Funza, which is here very considerable, passes along a narrow channel, on a high table land, and is poured as from the spout of a vase, in one arch of the enormous height above specified, the noise being heard at the distance of seven leagues. This fall is received in a vast cauldron of more than a league in circumference; and the quantity of water, and violence of its descent, form a continual mass of clouds, which renders it scarcely visible in the evening; but in the morning it is more striking, being decorated with numerous rainbows according to the position of the spectator. The vast rocks which form the cauldron also excite admiration, being as regular and polished as if cut with a chisel: the surrounding heights are covered with trees, shrubs, and flowery plants, while the splendid appearance of some of the birds, and the music of others, render the cataract of Tequendama alike sublime and beautiful.

TEQUEPA, a town of Mexico, in the province of Mechoacan, on a river near the Pacific ocean; 80 miles S.E. of Zacatula. N. lat.  $17^{\circ} 50'$ . W. long.  $102^{\circ} 26'$ .

TEQUERY BAY, a bay on the south-east coast of Cuba, near Cape Cruz.

TEQUIA, a town of New Grenada; 32 miles S.W. of Pamplona.

TEQUIXQUIACATZANATL, in *Ornithology*. See GRACULA *Quiscal*.

TER, in *Geography*, a river of Spain, which rises in the county of Cerdagne, and runs into the Mediterranean, about 20 miles E. of Gerona.

TERA, a small river of Spain, which runs into the Orbea, in the province of Leon.

TERACE, in *Rural Economy*, a term provincially applied to a coarse hair sieve, for separating the inferior flour from the bran.

TERAIN, in *Geography*, a river of France, which runs into the Oise, near Creil.

TERAKACO, a peninsula on the east coast of New Zealand, of which Cape Table forms the eastern point.

TERAMNUS, in *Botany*, so called by Browne, apparently in allusion to its delicately-shaped legume, *τετραμνως* being used particularly to express the tenderness of eatable pulse: *τετραμνος* was a weed hostile to leguminous plants.—Browne Jam. 290. Swartz Prodr. 105. Ind. Occ. 1238.

t. 25. Schreb. 489. Willd. Sp. Pl. v. 3. 971. Mart. Mill. Dict. v. 4.—Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionacea*, Linn. *Leguminosæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, two-lipped, permanent; its upper lip rather the largest, divided; lower three-cleft; all the teeth acute, erect, converging. *Cor.* papilionaceous. Standard inversely heart-shaped, spreading, somewhat deflexed. Wings nearly as long, erect, approximated, rounded at the extremity. Keel very small, concealed in the calyx between the bases of the wings, and covering the stamens, separable into two petals. *Stam.* Filaments ten, all united in their lower part into one set; only five of them perfect, the five intermediate ones being minute, without anthers, and shorter; anthers five, roundish. *Pist.* Germen cylindrical, slender, downy; style none; stigma capitate, roundish. *Peric.* Legume linear, bordered, compressed, with numerous constrictions. *Seeds* several, roundish, compressed, abrupt at the summit.

Ess. Ch. Keel minute, concealed in the calyx. Stamens all connected; the five alternate ones without anthers. Stigma sessile, capitate. Calyx two-lipped. Legume linear, with many seeds.

1. *T. volubilis*. Smaller Teramnus. Swartz Ind. Occ. 1241. t. 25. Willd. n. 1, excluding all the synonyms.—Leaflets ovato-lanceolate, downy beneath.—Native of rather moist bushy alpine places, in the southern part of Jamaica. The stem is herbaceous, or slightly woody at the base only, from two to four feet high, twining, slender, triangular, downy, simple or divided. Leaves alternate, distant, stalked, each of three leaflets, mostly obtuse with a small point, entire, ribbed and veiny, smooth and bright-green above; downy beneath; sometimes accompanied by a pair of smaller ones at the base. Their common footstalk is about an inch long, channelled, downy, with a pair of minute linear stipulas at the base. Clusters axillary, slender, simple, longer than the leaves, of several small reddish-blue flowers, in distant couples, on short partial stalks. Legume an inch long, slender, hairy, its point finally hooked; the valves spiral after bursting.

2. *T. uncinatus*. Great Hooked Teramnus. Swartz Ind. Occ. 1239. Willd. n. 2. (T. n. 1; Browne Jam. 290. Dolichos uncinatus; Lim. Sp. Pl. 1019. Phaseolus hirsutus, siliquis rectis et aduncis; Plum. Ic. 215. t. 221. Ph. sylvestris minor, flore minimo, siliquis longis teretibus albâ lanugine hirsutis; Sloane Jam. v. 1. 182.)—Leaflets oblong; silky beneath; hairy above.—Native of dry bushy places, in various parts of Jamaica. The root is long and slender. Stem herbaceous, subdivided, twining, slender, triangular, its angles hairy and somewhat bordered; the base woody. Leaflets one and a half or two inches long; their common stalk an inch, or inch and a half. Stipulas small, downy, deciduous. Clusters axillary, stalked, often a span long, twice the length of the leaves, many-flowered. Flowers in distant pairs, small, reddish. Legume two inches long, straight, narrow, compressed, hairy, ending in a bluntish hooked point.

TERAMO, in *Geography*, a town of Naples, in Abruzzo Ultra; the see of a bishop, immediately under the pope; 22 miles N.N.E. of Aquila. N. lat.  $42^{\circ} 37'$ . E. long.  $13^{\circ} 49'$ .

TERANE, a town of Egypt, on the west branch of the Nile; 18 miles N.W. of Cairo. N. lat.  $30^{\circ} 30'$ . E. long.  $30^{\circ} 45'$ .

TERANO, a town of Naples, in Calabria Citra; 3 miles W. of Bisignano.

TERASARSUK, a town of East Greenland. N. lat.  $59^{\circ} 55'$ . W. long.  $43^{\circ}$ .

**TERASPURG**, a town of Austria; 2 miles N. of Egenburg.

**TERATOSCOPIA**, formed of *τερας*, *prodigy*, and *σκοπεω*, *I consider*, a kind of divination by the appearance and view of monsters, prodigies, spectres, and phantoms.

**TERBEDH**, in the *Materia Medica*, a name given by Avicenna to the *turbith*, a purging drug, mentioned by all the authors of his time; but, in general, in a very confused manner.

Garcias tells us, that the Indians use it to purge phlegm, and that they add ginger to it by way of corrective; and Avicenna says the same thing of its use in his time.

**TERBURGH**, **GERARD**, in *Biography*, a painter of domestic scenes of exquisite skill, was born at Zwoll, in the province of Overijssel, in 1608, the son of a painter little known, from whom he received the rudiments of the art. He began his career as a painter of portraits in small, and had acquired considerable reputation, when he determined upon travelling through Germany and Italy. Unengaged by the sublimer beauties of art which the latter country offered to his view, he never changed his style, but went thence to Paris to practise it; and there met with considerable success. From thence he returned to Holland, and was highly appreciated, and fully employed. He attended the congress assembled at Munster in 1648, for the negotiation of the treaty of peace, and there painted his celebrated picture containing portraits of the plenipotentiaries and principal personages assembled on that occasion, which is regarded as his master-piece; and of which there is a print by Suyderhoef. While engaged upon this work, he was invited by count Pigorando, the Spanish ambassador at the congress, to visit Spain, and went there in consequence; where he was most favourably received, and much employed. The king conferred upon him the order of knighthood, and rewarded him munificently for the pictures he painted. Besides portraits, which constituted the principal part of his practice, he frequently painted conversations, musical parties, ladies at their toilettes, and domestic subjects, which he executed with a free, but rather a heavy pencil, not equal to the brilliancy of Metz and Netscher, but nevertheless exceedingly meritorious and agreeable; particularly in the close imitations of his draperies. He died in 1681, at Deventer, where he settled on his return from Spain.

**TERCERA**, or **TERCEIRA**, in *Geography*, one of the Azores islands, supposed to have derived its name from its standing the third in this cluster of islands in point of situation, though the first in dignity, as appears from a number of circumstances, and particularly from its communicating its name to the rest. This island is computed at 54 miles in circumference, and about 25 miles in length, by 15 in medial breadth. Its figure is almost circular, the coasts high, and so surrounded with craggy rocks, that it is deemed impregnable; every accessible part on the coast being defended by strong forts, heavy cannon, and a numerous and regular garrison. The only tolerable port in the whole island is the harbour of Angra. The island of Tercera is fertile, pleasant, and healthy: the very rocks, which elsewhere are dry and barren, produce here excellent vines, though not equal to those raised in the Canaries and Madeira. The land yields large crops of wheat and other grain, pasture for cattle, and a prodigious variety of lemons, oranges, and all those fruits peculiar to hot and cold climates, which are observed to be propagated to the greatest advantage in temperate countries. Besides Angra, there are several other towns and large villages in Tercera, with a number of forts and garrisons, under the direction of the governor, who has the

power of filling up all vacancies that happen among the military officers. N. lat. 38° 45'. W. long. 27° 6'.

**TERCERA**, a small island in the Atlantic, near the coast of Sierra Leone.

**TERCERO**, a river of South America, which rises in Tucuman, and joins the Salado on the borders of Paraguay.

**TERCHIZ**, or **TERSIZ**. See **TURSHISH**.

**TER-CHOOUZ**, in *Ornithology*. See **UPUFA Epops**.

**TERDINA**, in the *Materia Medica*, a name by which Paracelsus, and some other authors, have called the great garden-valerian. Ger. Emac. Ind. 2.

**TERDOPIO**, in *Geography*, a river of Italy, which runs into the Po, 12 miles E.S.E. of Lumello.

**TEREBELLA**, in *Natural History*, a genus of the Mollusca order of Vermes; the characters of which are, the body oblong, creeping, naked, furnished with branchiæ at the sides, more frequently in the tube; the mouth labiated, toothless, and projecting a clavated proboscis; the tentacula or feelers about the mouth numerous, capillary, and ciliated. Gmelin enumerates eleven

#### Species.

**CIRRATA**. Round, body with triple lateral pencils. Found in the sandy bottom of the Iceland sea.

**LAPIDARIA**. With eight cirri at the anterior parts of the body, about the mouth four. Found in the Mediterranean sea, within the clefts of rocks.

**CONCHILEGA**. Whitish, with numerous filiform cirri at the mouth, the upper longest; the branchiæ very red. Found in the sea washing the coast of Holland.

**COMPLANATA**. Depressed, mouth with four cirri; the lateral pencil-bearing warts of the body arranged on both sides in a two-fold series.

**CARUNCULATA**. Depressed-quadrangular, with a four-fold series of ventral pencils, and no cirri. Found in the American and Indian seas.

**ROSTRATA**. Tetraedrous, with a quadruple series of pencils from the body, and palate elongated. Found in the Indian sea.

**FLAVA**. Depressed, with thirty-seven branchiæ on both sides, and bifurcated tail. Found in the Indian sea.

**RUBRA**. Red, depressed; tail terminating with two cirri; the head with two horny moveable jaws. Found in the sea surrounding the islands of Zealand.

**APHRODITOIS**. Round, gradually attenuated backwards, below somewhat depressed with an obsolete furrow; no branchiæ in the eight first segments, in the following three simple, in the last sensibly greater, one being turned, pinnated. Found in the Indian sea.

**BICORNIS**. With a simple terminal two-horned disc of the proboscis. Found in the America ocean.

**STELLATA**. With a perfoliated triple disc of the proboscis; the anterior armed with a truncated horn, radiated with prickles. Found in the America ocean.

**TEREBELLA**, (dim. of *terebra*,) in *Surgery*, a trepan, or circular saw, for removing portions of the skull.

**TEREBIA**, in *Ancient Geography*, a town of Asia, in the Greater Armenia, E. of the sources of the Tigris. Ptolemy.

**TEREBINTACEÆ**, in *Botany*, the 94th order in Jussieu's system, the 12th of his 14th class, so denominated from the genus for which he chooses to retain the old name of *Terebinthus*, but which is the *Pistacia* of Linnæus. Many of the plants of this order abound in an essential oil of the nature of turpentine, or something like it. The characters are as follow.

*Calyx*

*Calyx* of one leaf, inferior, with a definite number of segments. *Petals* definite in number, (rarely wanting,) inserted into the lower part of the calyx, alternately with its segments, with which they agree in number. *Stamens* either the same number, alternate with the petals, or twice as many, inserted into the same spot. *Germen* superior, either simple, or more than one, of a determinate number. When the germen is single, the *style* is solitary, (rarely deficient,) with a simple or a divided *stigma*; when there are several germens, the stigmas equal them in number. *Fruit* either capsular, a berry, or a drupa, of one or more single-seeded cells. Where there are several germens, there are as many styles, or simple stigmas; and the same number of distinct single-seeded capsules. The *seeds* are generally lodged in a bony nut. The *corculum* is without an *albumen*, its radicle lateral, and reflexed upon the lobes. *Stem* arborescent or shrubby. *Leaves* alternate, without *stipulas*, either simple, or ternate, or pinnate with an odd leaflet.

Section 1. *Germen simple. Fruit of one cell, with a solitary seed.*

This comprises *Cassivium* of Jussieu and Lamarek, which is the Linnæan *Anacardium*; *Anacardium* of the same authors, which is *Senecarpus* of Linnæus; *Mangifera*; *Conarus*; *Rhus*; and *Rourea* of Aublet, Schreber's *Robergia*.

Seçt. 2. *Germen simple. Fruit of many cells, some of which are occasionally abortive.*

*Cnorum*; *Rumphia*; *Cosmocladia*; *Canarium*; *Icica* of Aublet; *Anyris*; *Toddalia*, which is *Crantzia* of Schreber, *Scopolia* of Sm. Plant. Ic. (see *SCOPOLIA*); *Scinus*; *Spathelia*; *Terebinthus* of Tournefort and Jussieu, the Linnæan *Pistacia*; *Bursera*; *Toluifera*; *Tapiria* of Aublet, which is Schreber's *Jonquetia*; *Poupartia* of Commerçon, perhaps not different from our *SPONDIAS Mangifera*; and *Spondias* itself, compose this section.

Seçt. 3. *Germen several. Fruit of many single-seeded capsules.*

Here are only three genera; *Simaba* of Aublet, which is Schreber's *Zwingeria*; *Aylanthus* of Desfontaines; and *Brucea* of L'Heritier.

Seçt. 4. *Genera akin to Terebintaceæ, but differing in being furnished with a fleshy albumen, which brings them near to RHAMNI*; see that article.

*Cneffis* of Jussieu, Lamarek Illustr. t. 387; *Fagara*; *Zanthoxylum*; and *Ptelea*.

Seçt. 5. *Genera akin to Terebintaceæ, and (like the true plants of this order) destitute of a fleshy albumen.*

*Dodonæa*; *Averrhoa*; and *Juglans*.

Jussieu announces an intention of dividing this order into *Cassuvia*, true *Terebintaceæ*, and *Zanthoxyla*; the first having simple leaves, a single-seeded fruit, and an ascending radicle; the second generally pinnate or ternate foliage, a drupa with several single-seeded nuts, and a descending radicle; and the third pinnate or ternate foliage, mostly marked with pellucid dots; fruit of many cells or many capsules, each with solitary seeds; and a fleshy albumen surrounding a straight corculum. A fourth order would arise out of certain genera now intermixed with the rest, but not properly coming under any of the three just defined, being themselves perhaps entitled to lay the foundation of future orders, not as yet discovered.

**TEREBINTHINA**, in *Medicine, Natural History, &c.* See **TURPENTINE**.

**TEREBINTHUS**, in *Botany*,  $\tau\epsilon\rho\beta\iota\nu\theta\omicron\varsigma$  of Dioscorides. See **PISTACIA** and **TEREBINTACEÆ**.

**TEREBOTIN**, a word used by Paracelsus for the common turpentine.

**TEREBRA**, from  $\tau\epsilon\rho\beta\epsilon\alpha$ , to bore, a trepan, or trophinc.

Also, an instrument called a perforator, such as is contained in the generality of cases of trephining instruments, and is used for making a hole, in which the centre pin of the trephine is to work.

**TEREBRATULA**, in *Natural History*, a name given by Mr. Lhuys and Gualtieri to some species of the smooth conchæ anomia, which have near the head of the shell a small hole, which looks as if bored by art. See **CONCHÆ Anomia**, and **SHELLS**.

**TERECOL**, in *Geography*, a town of Hindoostan, in Concan; 16 miles N.N.W. of Goa.

**TEREDO**, in *Natural History*, a genus of the Testacea order of Vermes, the characters of which are, that the animal is a terebella, with two hemispheric calcareous valves, cut off before, and two lanceolated; the shell is round, flexuous, and capable of penetrating wood. Gmelin reckons three

#### Species.

**NAVALIS**. The shell very slender, cylindric and smooth.

**UTRICULUS**. Shell solid, cylindric and undulated.

**CLAVA**. Shell clavated at one end, the other curved, narrower, obtuse, and perforated in the middle.

The head of the *Teredo navalis*, called by Linnæus *calamitas navium*, is well prepared by nature for the hard offices it is to undergo, being coated with a strong armour, and furnished with a mouth like that of the leech; by which it pierces wood, as that animal does the skin: a little above this it has two horns, which seem a kind of continuation of the shell; the neck is as strongly provided for the service of the creature as the head, being furnished with several strong muscles; the rest of the body is only covered by a very thin and transparent skin, through which the motion of the intestines is plainly seen by the naked eye; and by means of the microscope, several other very remarkable particulars become visible there.

This creature is wonderfully minute when newly excluded from the egg, and at its utmost bigness is a foot long; three or four inches are however its more frequent length.

When the bottom of a vessel, or any other piece of wood constantly under water, is inhabited and injured by ever so great a number of these worms, there is no sign of the damage to be perceived on the surface, nor are the creatures visible till the outer part of the wood is cut or broken away; then their shelly habitations come in sight: these lie so near the surface, however, as to have an easy communication with the water, and there is a multitude of little perforations in the very surface through which the inhabitant insects throw out the extremities of their little shelly horns; these are of a reddish colour, and may be distinguished by an accurate observer in form of so many red prominent points; they all are retracted on the least touch, and are thrown out again as soon as all is quiet. From these points, or the small apertures which give them a way out, are the cells of the terebines to be traced. They are composed of a pearly or shelly matter, which forms a long tube with various windings and turnings, which mark the abode of the creature; but which usually neither adheres to the body of the animal nor to the wood. These cases or tubes are always more or less loose in the wood, and there is ever a large space within them, for the body of the animal to be surrounded every way with water. They are very smooth on the inner surface, and somewhat rougher without; and are much harder and firmer in the cells of the older and larger animals than in those of the young ones.

These shelly tubes are composed of several rings, or an-

nular parts; but these differ greatly in their length. There is an evident care in these creatures, never to injure one another's habitations; by this means each tubule or case is preserved entire, and in such pieces of wood as have been found eaten by them into a sort of honey-comb, there never is seen a passage or communication between any two of the tubules, though the woody matter between them often is not thicker than a piece of writing-paper.

The vast increase of these animals, and their shelly tubules, naturally lead to a consideration of the manner of their generation; and when we consider that each of these creatures is, from the time when it is produced from the egg, immediately lodged in a cell, in which it lives without the least possibility of getting into that of another animal of its own kind, or receiving one of them into its own, it is not easy to account for the propagation of the species in the common way. This, however, is solved by an accurate anatomical observation of the animals themselves, since in every individual the parts of generation in both sexes, and both the semen and ovula are found. Each individual therefore evidently serves by itself for the propagation of the species; and this is probably very often the case in earth-worms, and other of the hermaphrodite animals. All the yet known kinds of these being soft-bodied; and probably, though they often meet one another, and copulate in pairs, yet when they have not opportunity, the parts copulate in the individual.

Eggs are found in great plenty in the bodies of these animals in June, and are discharged with the water into the sea, where the far greater part of them, doubtless, become food for other small marine animals; and the few that affix themselves to any piece of wood they are washed against, batch and get into its substance in the manner of their parents.

The kind of wood in which these worms are lodged, makes a great difference in the appearance of their cells, as they work much more speedily and successfully in some kinds than in others. The fir and alder are the two kinds they seem to eat with the greatest ease, and in which they grow to the greatest size. In the oak they seem to make but a very slow progress, and usually appear very small, and poorly nourished. The colour of their shelly tubules is often brown in this wood; which seems plainly owing to the effect of its juices.

Poisonous ointments are also found to be of some use in destroying them, on rubbing over the wood: some have thought that burning the surface was an effectual way of preserving them, but this has been found to be otherwise. The surest method of avoiding them in particular works, is the using of bitter or very solid woods; the first kind they are found never to touch, and in the other they make but slow progress. Mixtures of lime, sulphur, and colocynth, with pitch, for covering over the surfaces of boards, &c. have been found of some use.

It seems very evident, that boards and other pieces of wood have been subject to be eaten by these animals, from all times that we have any knowledge of; for the stone called *lapis syringoides* is evidently no other than wood thus eaten, petrified by long lying in the earth, together with the tubules of the worms. The masses of this with the grain of wood yet plain in them, are common in many places among sea-shells, and other marine remains at great depths, and have evidently been brought thither in very distant times, and before those changes were made in the surface of the earth of which we have no accounts in our earliest histories. Sellii Hist. Natur. *Teredinis*.

TEREDON, in *Ancient Geography*, a town of Asia, in

Babylonia, on an island which was formed by the Tigris at its mouth. (Ptol.) Dionysius Periegetes places the town of Teredon at the mouth of the Euphrates.

TEREK, in *Geography*, a mountain of Asia, between Great and Little Bucharía.

TEREK, one of the rivers that fall into the Caspian sea. It originates in the Caucasian mountains, runs at first towards the W. and S., but turns afterwards entirely to the E. and in about N. lat. 44°, and E. long. 65°, discharges itself into the Caspian. It takes up in its course the Bakfan, the Malka, and the Soonsha, among many other mountain-brooks and rivers. Its source lies properly in the Snow-mountains of Caucasus, on the highest partition-ridges of the frontiers of Georgia. It is rapid in its course; and, in the months of July and August, when the snow melts, swells to the height of eight or ten feet above its usual level in autumn, winter, and spring; overflowing its banks, and inundating the adjacent country, forming for itself new beds, and choking the old with sand. In its lower course, as far as Kitzliar, it is almost entirely unaccompanied by woods; farther up, to Starogladka, by a few; and thence upwards, its banks are richly garnished with forests, particularly of oaks, wild fruit-trees, and a variety of others. It does not freeze over every year, though in winter it abounds with driving ice. In this season its water is tolerably clear, which at other times, above Kitzliar, is turbid, with earthy particles; but when taken up, it soon becomes clear, and is then bright, well-tasted, and of good quality. Below Kitzliar, the river has a less fall, and separates into several arms, in which the parted stream flows so gently, that it has time to deposit its earthy particles, which alternately fill up these arms; so that one or the other occasionally represents the main river. In the lower regions, on the shores of the Terek, are seen vineyards, mulberry and other fruit-trees, to which succeed salt-lakes, and springs of the same nature. Its bed is formed mostly of sand and clay. With regard to fish, the Terek, as well as all its collateral rivers, is poor. Yet there are caught in it sturgeon (*acipenser sturio*), beluga (*acipenser huso*), ferruga (*acipenser stellatus*, Pall.), plenty of salmon, fat-fish (*cyprinus chalcoides*), carp, barbel (*cyprinus barbatus*), shad, pike, sudak (*lucio perca*), perch (*perca fluviatilis*), lechtz (*cyprinus barba*), otters, beavers, tortoises, &c.

TEREK, in *Ornithology*. See *SCOLOPAX Cincera*.

TERELLA, in *Geography*, a town of Naples, in the Molise; 4 miles N. of Molise.

TERENCE, PUBLIUS TERENTIUS, in *Biography*, a Latin writer of comedies, was born, as it is supposed, at Carthage about the year of Rome 560 (B.C. 194.) Being brought to Rome as a slave, when young, he was in the service of a person named Terentius, a senator, from whom he derived his name. The purity and politeness of his language evince his having enjoyed the benefit of a good Roman education. After his emancipation, he was honoured with the friendship of several Romans of rank, such as Scipio Africanus the younger, and the younger Lelius. His comedies were founded upon the Greek model, and translated, either wholly or in part, from the Greek. The first comedy which he is said to have brought upon the stage, was the "Andrio," represented in the year B.C. 166. But though this was the first of his comedies that was acted, it appears that it was not the first which he had written. The six comedies of Terence that are still extant were exhibited at Rome from the year B.C. 166 to 160. They were heard with great applause; the "Eunuchus" was repeated twice in the same day, and he is said to have received for it 8000 sesterces (about 64*l*.) Scipio and Lelius,

Lelius, as tradition reports, had a great part in the composition of Terence's comedies. Terence himself in a prologue seems tacitly to acknowledge the fact. But modern writers and critics, who have reasoned on this fact, think it very improbable. Generals and statesmen were not persons likely to possess the habit of dramatic composition, whatever previous hints or subsequent corrections they might furnish; and besides it is observed, that no writings more strongly indicate by their style and manner that they are the production of a single hand than those of Terence. After he had presented these comedies to the public he departed for Greece, and never returned to Rome. Some have accounted for this circumstance, by supposing that he perished by shipwreck; others affirm that he died in Greece, from the grief he experienced on account of the loss of his baggage and some new comedies, which he had composed, by an accident at sea.

The judgment of critics on the performances of Terence has been very different, though their real merit is said not to be of difficult estimation. It is generally allowed that he is defective in invention and originality of observation. This sufficiently appears from his having Greek manners and characters in all his plays. He was likewise a plagiarist, with regard to the sentiments, as well as to the plots and incidents of his pieces; but a very competent judge observes, "that he is justly entitled to the praise of judicious selection, happy disposition, and purity and neatness of language; and that, as a Latin writer, in a style of elegance of which there are so few examples, he was highly prized in his own times, and is invaluable in ours. Cicero, who speaks of him as a translator of Menander, applauds him as the only one who had expressed in the Latin language all the politeness and amenity of the original; and Cæsar, in some well-known lines, calls him 'the lover of pure diction;' and also by the epithet of the *halved Menander*; and his regret that Terence did not possess the *vis comica*, as well as the other excellencies of his model, points out his deficiencies." Of the numerous editions of Terence, the most esteemed are the following; viz. the "*Variorum*," Amst. and Lugd. Batav. 1686; "*Bentleii*," Cantab. 4to. 1726; "*Westerhovii*," Hag. C. 4to. 1726; "*Zeunii*," Lips. 8vo. 1774; "*Bruckii*," Basil. 4to. 1779. Voss. Poet. Lat. Gen. Biog.

TERENJABIN, in the *Materia Medica of the Ancient Arabians*, a word used to express a kind of manna called by some *manna massichina*, from its round globules resembling the drops of mastich, and by the physicians of many parts of the world at present, *Manna Persicum*; which see. See farther about this drug in Philof. Trans. N<sup>o</sup> 472. vol. xliii. p. 87.

TERES LIGAMENTUM, in *Anatomy*, one of the ligaments of the hip-joint. See EXTREMITIES.

TERES *Ligamentum Uteri*. See GENERATION.

TERES *Major* and *Minor*, two muscles of the shoulder, so called, because their figure is somewhat rounded.

The *teres major* (scapulo-humerien, le grand rond) is elongated and flattened, placed at the lower and back part of the shoulder, and extending from the inferior angle of the scapula to the posterior edge of the bicipital groove of the humerus. The latissimus dorsi, the skin, and the long head of the triceps, cover it behind; in front, it is covered by the latissimus, the axillary vessels and plexus of nerves, the short head of the biceps, and the coraco-brachialis. Its upper edge corresponds first to the *teres minor*, then is separated from that muscle by the long head of the triceps, and lastly corresponds to the subscapularis, from which the circumflex vessel and nerve separate it. The lower edge, covered by

the skin, forms, with the latissimus, the border of the axilla. The inferior or external extremity of the muscle is fixed to the external surface of the inferior angle of the scapula, and to the neighbouring part of its lower edge: thence it ascends, passing obliquely outwards, retaining nearly a uniform breadth (about three fingers) throughout; and is attached to the posterior margin of the bicipital groove. The latter attachment takes place by means of a flattened tendon, about an inch broad, which corresponds in front to that of the latissimus dorsi. There is a small bursa mucosa between its posterior surface and the humerus. It lines the bicipital groove by some fibres, which meet those of the pectoralis major. Muscular fibres arise from the outer surface and inferior angle of the scapula, from the lower portion of the inferior costa, and from a septum between this muscle and the infraspinatus; and they terminate on the tendon just described. It carries the arm backwards; depresses it when it has been raised; rotates the humerus on its axis, so as to turn the arm inwards or forwards. In conjunction with the latissimus, and pectoralis major, it will fix the arm against the side. It will pull the scapula forwards or upwards to the arm, when that is fixed.

*Teres minor* (petit rond) is a small elongated muscle, lying at the posterior and under part of the shoulder, extending from the inferior edge of the scapula to the external tubercle of the humerus. Covered behind by the deltoid and skin, it covers in front the edge of the scapula, the infrascapular artery, the long head of the triceps, and the orbicular ligament of the shoulder-joint. Its upper edge is either continuous with the infraspinatus, so that they form but one muscle, or is separated from it by a cellular line. Towards the back part there is an aponeurotic septum between them. The lower edge is close to the *teres major* behind, but separated from it anteriorly by the long head of the triceps. The lower or posterior extremity is small and pointed, and begins its attachment to the scapula, just where that of the *teres major* ends, between the latter muscle and the infraspinatus: it passes obliquely upwards and outwards, fixed to the lower and outer edge of the scapula, and is inserted in the lower or back part of the great tubercle of the humerus. This insertion is effected by means of a tendon, closely connected to that of the infraspinatus, dispersing some of its fibres on the orbicular ligament, and receiving the fleshy fibres in all directions from the origin of the muscle. Its action has exactly the same effect with that of the *infraspinatus*; which see.

TERES *Folium*, in *Botany*. See LEAF.

TERESA, or THERESA, in *Biography*, a saint in the Roman Catholic church, was born, of a noble family, at Avila, in Old Castile, in March 1515. Her father, by reading the lives of saints to his family, inspired her, at an early age, with an enthusiastic fervour, which induced her to elope with one of her brothers, to seek martyrdoms among the Moors. When they were brought back, they indulged the same passion by constructing little hermitages in the garden, whither they retired to perform their exercises of devotion at twelve years of age. Teresa lost her mother, and was boarded in an Augustine convent, and this situation prevented her being seduced by the pleasures of the world, for which she began to indulge a propensity in consequence of reading romances; but for her farther security she took the veil in the Carmelite monastery of the Incarnation at Avila, in her twenty-second year. Her person was beautiful, and attracted the admiration and love of all who saw her; but her religious ideas, though tender and rapturous, were austere; and perceiving that the discipline of the house in which she resided was relaxed, she undertook a reform of the Carmelite order. After much opposition, she succeeded in establishing the

first monastery of the female reform at Avila, in 1562, and having extended her plan to the religious males of the order, she founded in 1568 the monastery of Dorvello, which was the origin of the more rigid, or barefooted, Carmelites. Her zeal and assiduity enabled her to found thirty religious houses of the reform, fourteen for men and sixteen for women; and after her death it extended through all the Catholic countries of Christendom. Teresa died at Alva in October 1582, in the 68th year of her age. She was canonized by Gregory XV. in 1621; and afterwards became the patron saint of Spain. See CARMELITES.

TERESA, in *Geography*, a town of Spain, in the province of Valencia; 10 miles N.W. of Segorbe.

TERESSA. See TERRESSA.

TERETES, in *Horses*, one of the three sorts of worms which infest the bodies of them, and which are very troublesome and injurious. See ASCARIDES, BOTS, and WORMS.

This sort of worm, which is found in horses, resembles the common earth-worms in many respects, being only sharper at both ends, callous towards the middle, and they do not contract or dilate themselves so easily. Some of these, which have been seen to come from horses, hinder them from thriving till they are dislodged by proper remedies.

TERETRUM, in *Surgery*. See TEREBRA.

TERFEZ, in *Natural History*, the name given by the Africans to the truffles found in the deserts of Numidia, and other places in that part of the world, in great abundance.

These are much more delicately tasted than the European truffles, and are white on the outside. They are called by some of the Africans *kema*, and by the Arabian writers *cantha* and *camabe*.

TERFOWA, in *Geography*, a town of Africa, in the kingdom of Tunis; 120 miles S. of Tunis.

TERFOWY, a town of Nubia; 150 miles S. of Syene. N. lat. 21° 40'. E. long. 34° 5'.

TERGA, a town of Morocco, on the Morbeya; 90 miles N. of Morocco.

TERGA. See HAIR.

TERGARRY, a town of Hindoostan, in Bednore; 14 miles S.E. of Simogu.

TERGAZA, in *Ancient Geography*, a town of Africa, which was one of those which Manlius took possession of in the third Punic war, and which he pillaged.

TERGESTE. See TRIESTE.

TERGESTICUS SINUS, a gulf of Italy, on the coast of the Adriatic sea. It took its name from the town Tergeste, which was situated there.

TERGIFOETOUS PLANTS, such as bear their seeds on the back-sides of their leaves: such are the capillaries. See CAPILLARY.

TERGIL, in *Geography*, a town of Asiatic Turkey, in the province of Erzerum; 30 miles E. of Palu.

TERGIS, in *Ancient Geography*, a town of Africa, in Libya, on the confines of Ethiopia.

TERGISONUS, a river of Italy, in Venetia, N. of the river Padus.

TER-GOUD, or TER-GOUW, in *Geography*. See GOUD.

TERGOVITZ, or TERGOVISTA, a town and capital of Walachia, where the waiwode has a palace; 64 miles S.E. of Hermentstadt. N. lat. 45° 3'. E. long. 25° 29'.

TERHALTEN, a small island near the coast of Terra del Fuego. S. lat. 55° 20'.

TERHEY, a town of Holland; 10 miles W. of Delft.

TERIDATA, in *Ancient Geography*, a town of Asia, in Mesopotamia, on the banks of the Euphrates. Ptolemy.

TERINA, a town of Italy, upon the western coast of

Brutium, and in the northern part of the gulf Hipponium.— Also, a town of Asia, situated in the mountains W. of Moxouné.

TERIUM, a town of Macedonia, in Pieria.

TERKAT, in *Geography*, a town of Asiatic Turkey, in the government of Sivas; 20 miles N.W. of Tocat.

TERKELA, a river of Africa, which joins the Tafilet, 20 miles S. of Togda.

TERKI. See TEREK.

TERKI. See TURKIN.

TERKIRI, a lake of Thibet, about 80 miles long and 25 broad. N. lat. 32°. E. long. 91° 14'.

TERKUL, a river of Russia, which runs into the Ural, at Uralfk, in the government of Caucalus.

TERLIZZI, a town of Naples, in the province of Bari; 7 miles S.E. of Trani.

TERLON, a river of France, which runs into the Sambre, about 3 miles below Landrecy.

TERM, TERMINUS, the extreme of any thing, or that which bounds and limits its extent. See EXTREME.

TERM, in *Geometry*, is sometimes used for a point, sometimes for a line, &c. A line is the term of a superficies, and a superficies of a solid.

This is what the schools call *terminus quantitatis*.

TERM, in *Law*, signifies a boundary, or limitation of time, or estate.

In this sense we say, a lease for term of life, for term of years, &c.

TERMS, *Termes*, *Termini*, in *Architecture*, denote a kind of statues, or columns, adorned at top with the figure of a man's, woman's, or satyr's head, as a capital; and the lower part ending in a kind of sheath, or scabbard. See HERMES.

Some write the word *thermes*, from *Hermes*, a name the Greeks gave the god Mercury; whose statue, made after this manner, was placed in several of the cross ways in the city of Athens, &c. Others bring the etymology of the word from the Roman god Terminus, the protector of landmarks; whose statue (made without hands or feet, that he might not change his place) was used to be planted at the bounds of lands, to separate them.

Terms are sometimes used as consoles, and sustain entablatures; and sometimes as statues, to adorn gardens. Of these termini, the architects make great variety; viz. *angelic*, *rustic*, *marine*, *double*, in *buft*, &c.

TERMS, *Miliary*, *termini miliares*, among the ancient Greeks, were the heads of certain divinities, placed on square land-marks of stone, or on a kind of sheath, to mark the several stadia, &c. in the roads. These are what Plautus calls *lares viales*.

They were usually dedicated to Mercury, whom the Greeks believed to preside over the highways.

Some of them were represented with four heads, such as we still see in Rome, at the end of the Fabrician bridge; which is hence called *ponte di quattro capi*. It is known that Mercury was thus represented, and also called by the Latins *Mercurius quadrifrons*; as being supposed the first who invented the use of letters, music, wrestling, and geometry. See HERMES.

TERMS are also used for the several times or seasons of the year, in which the tribunals, or courts of judicature, are open to all who think fit to complain of wrong, or to seek their rights by due course of law, or action; and during which the courts in Westminster-hall sit and give judgment. But the high court of parliament, the chancery, and inferior courts, do not observe the terms; only the courts of king's bench, common pleas, and exchequer, which are the highest courts

courts at common law. In contradistinction to these, the rest of the year is called *vacation*.

Of these terms there are four in every year, during which time matters of justice are dispatched.

*Hilary* term, which, at London, begins the 23d of January, or if that be Sunday, the next day after; and ends the 12th of February following.

*Easter* term, which begins the Wednesday fortnight after Easter-day, and ends the Monday next after Ascension-day.

*Trinity* term, beginning the Friday next after Trinity-Sunday, and ending the Wednesday fortnight after.

*Michaelmas* term, which begins the 6th of November, and ends the 28th of November following.

Each of these terms has also their *returns*; which see.

These terms are supposed by Mr. Selden to have been instituted by William the Conqueror; but sir H. Spelman hath shewn, that they were gradually formed from the canonical constitutions of the church; being no other than those leisure seasons of the year, which were not occupied by the great festivals or fasts, or which were not liable to the general avocations of rural business. Throughout all Christendom, in very early times, the whole year was one continued term for hearing and deciding of causes. For the Christian magistrates, in order to distinguish themselves from the Heathens, who were very superstitious in the observation of their *dies fasti* and *nefasti*, administered justice upon all days alike; till at length the church interposed, and exempted certain holy seasons from being profaned by the tumult of forensic litigations; as, particularly, the time of Advent and Christmas, which gave rise to the winter vacation; the time of Lent and Easter, which created that in the spring; the time of Pentecost, which produced the third; and the long vacation, between Midsummer and Michaelmas, which was allowed for the hay-time and harvest. All Sundays also, and some peculiar festivals, as the days of the Purification, Ascension, &c. were included in the same prohibition, which was established by a canon of the church, A.D. 517, and fortified by an imperial constitution of the younger Theodosius, comprised in the Theodosian code. Afterwards, when our own legal constitution was established, the commencement and duration of our law terms were appointed, with a view to these canonical prohibitions; and it was ordered by the laws of king Edward the Confessor, that from Advent to the octave of the Epiphany, from Septuagesima to the octave of Easter, from the Ascension to the octave of Pentecost, and from three in the afternoon of all Saturdays till Monday morning, the peace of God and holy church shall be kept throughout the whole kingdom.

And so extravagant was afterwards the regard paid to these holy times, that though the author of the Mirror mentions only one vacation of considerable length, containing the months of August and September, yet Britton says, that in the reign of king Edward I. no secular plea could be held, nor any man sworn on the Evangelists, in the time of Advent, Lent, Pentecost, harvest, and vintage, the days of the great litanies, and all solemn festivals. He adds, that the bishops and prelates granted dispensations for taking assizes and juries in some of these holy seasons, upon reasonable occasions; and soon after a general dispensation was established in parliament by stat. Westm. 1. 4 Edw. I. cap. 51, that assizes of novel disseisin, mort d'ancestor, and darrein presentment, should be taken in Advent, Septuagesima, and Lent, as well as inquests; at the special request of the king to the bishops. The portions of time that were not included within these prohibited seasons, fell naturally into a fourfold division; and from some festival, or saint's day that immediately preceded their commencement, were denominated the

terms of St. Hilary, of Easter, of the Holy Trinity, and of St. Michael: which terms have been since regulated and abbreviated by several acts of parliament; particularly Trinity term by stat. 32 Hen. VIII. c. 2. and Michaelmas term by stat. 16 Car. I. c. 6. and again by stat. 24 Geo. II. c. 38. Blackst. Com. vol. iii.

**TERMS, Oxford.** Hilary or Lent term begins January 14th, and ends the Saturday before Palm-Sunday. Easter term begins the tenth day after Easter, and ends the Thursday before Whitsunday. Trinity term begins the Wednesday after Trinity-Sunday, and ends after the act, or 6th of July, sooner or later, as the vice-chancellor and convocation please. Michaelmas term begins October 10th, and ends December 17th.

**TERMS, Cambridge.** Lent term begins January 14th, and ends the Friday before Palm-Sunday. Easter term begins the Wednesday after Easter-week, and ends the week before Whitsunday. Trinity term begins the Wednesday after Trinity-Sunday, and ends the Friday after the commencement, or 2d of July. Michaelmas term begins October 10th, and ends December 16th.

**TERMS, Scottish.** In Scotland, Candlemas term begins January 23d, and ends February 12th. Whitsuntide term begins May 25th, and ends June 15th. Lammas term begins July 20th, and ends August 8th. Martinmas term begins November 3d, and ends November 29th.

**TERMS, Irish.** In Ireland the terms are the same as at London, except Michaelmas term, which begins October 13th, and adjourns to November 3d, and thence to the 6th.

**TERM, in Grammar,** denotes some word or expression in a language. See **WORD**.

The word *term*, *terminus*, is borrowed metaphorically, by the grammarians and philosophers, from the measurers or surveyors of lands: as a field is defined and distinguished by its *termini*, or limits, so is a thing or matter spoken of, by the word or term by which it is denoted.

**TERM, in the Arts, or Term of Art,** is a word which, besides the literal and popular meaning which it has, or may have, in common language, bears a farther and peculiar meaning in some art or science. See **ART**.

Or, a term is a word which has one or more meanings beside its grammatical one; or which has a peculiar force or import in the language of some particular science or art.

A word then becomes a term when its idea is rendered more complex, consists of more parts, and includes more special circumstances, on some occasions than others.

It is this greater complexness, this excess of constituent parts of the idea, that denominates it a term in the general. Farther, as the parts of the idea, signified by any word, are arbitrary; and as one may not only add new parts to those contained in the literal meaning, but also superadd others to them, alter them, extend them, and otherwise modify them at pleasure; hence the same word becomes a term of this or that art, or both, as the inventors or improvers of those arts have thought fit to adopt it for the common basis of certain ideas, and to modify and circumscribiate its meaning to the use of their respective arts. See **DEFINITION**.

**TERMS, abstract, complex, concrete, equivalent, equivocal, general, relative, synonymous, univocal.** See the adjectives.

**TERM, in Logic.** A proposition is said to consist of two terms, *i. e.* two principal and essential words, the *subject* and the *attribute*.

A syllogism consists of three terms, the *major*, *minor*, and *conclusion*. See **SYLLOGISM**.

**TERMS of an Equation, in Algebra.** See **EQUATION**.

**TERMS of Proportion, in Mathematics,** are such numbers, letters,

letters, or quantities, as are compared one with another. See **PROPORTION**.

**TERMS**, or *courses*, in *Medicine*, the menses, or women's monthly purgations.

**TERMALY**, in *Geography*, a town of Hindoostan, in Myfore; 15 miles N.E. of Anantpour.

**TERMED**, or **TARMAD**, a town of Grand Bucharia, at the union of two large rivers, whose united streams form the Jihon; the capital of a considerable district. In 1221, this town was besieged by Jenghis Khan, and, after eleven days, taken by assault: after which the conqueror put most of the inhabitants to the sword, and destroyed the town. It was rebuilt in the following century; 130 miles S. of Samarcand. N. lat. 37° 30'. E. long. 65° 48'.

**TERMEH**, or **KARMILI**, a river of Asiatic Turkey, which runs into the Black sea, 30 miles N.E. of Samsoon.

**TERMERA**, or **TERMERIUM**, in *Ancient Geography*, a free town of Asia Minor, in Caria.

**TERMES**, called *Tierme*, a town of Hither Spain, belonging to the Arevaci, S. of Numantium.

**TERMES**, in *Entomology*, a genus of the Apera order of insects. Its characters are, that it has six legs formed for running; two eyes; setaceous antennæ, and a mouth with two jaws. According to Gmelin, the characters are, that the mouth has two horny jaws, with a horny, quadrid lip, linear acute fringes, four equal filiform feelers, or palpi, antennæ (mostly) moniliform, and two eyes. Linnæus enumerates three, and Gmelin eight

#### Species.

**FATALE**. Above brown; thorax with three segments; wings pallid, and costa, or rib, testaceous. This is the destructor of Degeer, and *T. bellicosum* of Smeathman. It is found in the shady parts of the equinoctial regions of India and Africa. See the sequel of this article.

**DESTRUCTOR**. Above testaceous; head black; antennæ yellow. Found in the islands opposite to South America, Africa, and India.

**ARDA**. Black; abdomen with segments white at the apex; legs pallid. Found in the equinoctial parts of Africa.

**MORDAX**. Black; the segments of the abdomen white at the apex; legs black. Found in the equinoctial parts of Africa.

**CAPENSE**. Yellow, with hyaline wings; brown at the margin. Found in India and Southern Africa.

**FATIDICUM**. Abdomen ovate; month pallid; brown eyes; antennæ setaceous. Found in Europe, chiefly the southern part.

**PULSATORIUM**. Abdomen oblong; mouth red; eyes yellow; antennæ setaceous. Found in Europe and America.

**DIVINATORIUM**. Abdomen transversely fulcated; brown mouth, and black eyes. Chiefly found in books; very lively, irritable, and whitish.

It is observed, that the European species of termes are very small, compared with those of the warmer regions of Africa and America; and instead of being gregarious, as in those climates, are usually found single. Of these, the most known is the *T. pulfatorius* of Linnæus, a small insect of a whitish colour, and distinguished by Derham and some other naturalists, by the appellation of "*Pediculus pulfatorius*." During the months of summer it is common in houses, particularly in decayed wainscots, and is remarkable for emitting a long-continued sound, resembling the ticking of a watch; it is commonly met with in collections of dried plants, &c. to which it is very injurious. It cannot bear, on account of its tender frame, the slightest pressure, and it

is very quick in its motion. When magnified, the head appears large, the eyes very conspicuous, of a beautiful golden colour, and divided into innumerable hexagonal convexities; the antennæ long and setaceous; the palpi two in number, moderately long, and terminating in a large club-shaped top; the thorax rather narrow, and the abdomen obtusely oval; the thighs, or first joints of the legs, thick, the remaining ones slender, and the feet furnished with very small claws. The whole animal is beset with scattered hairs. This insect, according to the observations of Derham, when first hatched from the egg, is white, oval, and very small, exactly resembling a common mite; furnished with eight legs, and beset with long hairs. After a certain time it casts its skin, and appears in the form already described. Degeer has found on each side of the thorax the appearances of rudiments of wings, resembling a pair of oblong scales; and Dr. Shaw affirms, from his own observations, that some individuals of this species become winged at their full growth; the wings, four in number, being very large, of a slightly indistinct appearance, and variegated with blackish and brown clouds or spots. In the beginning of July this change takes place, and several insects may be seen with the wings half-grown; in a few days they gain their full size.

Dr. Derham is of opinion, that the ticking sound of these animals is analogous to the call of birds to their mates during the breeding season; and this opinion is very probable. This sound, says Dr. Shaw, as well as that produced by the "*Ptinus fatidicus*," or death-watch, seems to prove in a convincing manner, that insects possess the faculty of hearing, though this be denied by some naturalists.

Of the exotic termites, the most remarkable is the *T. bellicosus*. The animals of this species have lately been minutely described by Mr. Smeathman, from whose account the following particulars are extracted.

The termites, which have been taken notice of by various travellers in different parts of the torrid zone, and called by the name of white ants, resemble the ants in their manner of living, which is in communities, forming extraordinary nests in the surface of the ground, and various subterraneous passages, and also in their provident and diligent labour; but in both respects much surpasses them. The termites are represented by Linnæus as the greatest calamity of both Indies, because of the havoc they make in all kinds of wooden buildings, utensils, and furniture, so that nothing but metal or stone can escape their destructive jaws.

Smeathman observes, that the insect in its perfect state has four wings without any stinging, and should therefore be ranged under the *neuroptera*, and not under the *aptera* of the Linnæan system. The communities of termites consist of one male and one female, generally the parents of all the rest, and of three orders of insects, apparently of very different, though really of the same species. Those of the first order are the working insects, or labourers; the second comprehends the fighting insects, or soldiers, which do no labour; and the third are the winged ones, or perfect insects, which are male and female, and capable of propagation, but neither labour nor fight; the kings and queens belong to this order, and within a few weeks after they are elected and elevated to this rank, they migrate, and either establish new kingdoms, or perish within a day or two. The largest species, called *termes bellicosus*, is the best known on the coast of Africa; it creeps immense buildings of well-tempered earth or clay, which are constructed with signal ingenuity: it does infinite mischief in one respect, and in another it is peculiarly important and useful, by destroying those vegetable or animal substances which incumber the earth, and are noxious on account of their putridity. The buildings

buildings (usually termed hills) which these insects erect, are in their general form like fugar-loaves, and about ten or twelve feet high; and consist of an exterior part, which is large and strong, intended partly for defence, and partly for preserving a regular degree of warmth in order to hatch the eggs and cherish the young: and an interior, which is the habitable part, divided into many apartments for the residence of the king and queen, the nursing of their progeny, the accommodation of the soldiers and labourers, or magazines of provision. The royal chamber, in the interior building, or that occupied by the king and queen, is situated near the centre, and usually in the shape of a semi-oval within.

In the infant state of the colony, it is not more than about an inch in length, but in time it is enlarged to six or eight inches in the clear, being in size adapted to that of the queen. It has doors or entrances, at pretty equal distances from each other, which entrances are of a size not to admit any animal larger than the soldiers and labourers: so that the king and queen, when once immured, can never go out. The royal chamber is surrounded by many others of different sizes, shapes, and dimensions; and they either open into each other, or communicate by passages suitably contrived. These apartments are connected with the magazines, formed altogether of clay, and nurseries. The provisions lodged in the former appear by the microscope to consist principally of the gums or inspissated juices of plants. The nurseries are composed entirely of wooden materials, joined together apparently with gums. These nurseries are occupied by the eggs, and young insects, which appear at first in the shape of labourers, but white as snow. They are very compact, and divided into small chambers, not one of which is to be found of half an inch in width. They are placed round and near the royal apartments. As the queen enlarges, her chamber is also enlarged; and new apartments are fitted up for her attendants; and also new nurseries at a remoter distance. Thus, says Mr. Smeathman, they continually enlarge their apartments, pull down, repair, and rebuild, according to their wants, with a degree of sagacity, regularity, and foresight, not even imitated by any other kind of animals or insects which he has ever heard of. These nurseries are always found slightly overgrown with or plentifully sprinkled with small white globules, about the size of a small pin's head, first supposed to be the eggs, but found by the microscope to be small mushrooms. The royal chamber is situated at about a level with the surface of the ground, at an equal distance from all the sides of the building, and in every direction surrounded by the apartments of labourers or soldiers, for the purpose of attendance. These apartments compose an intricate labyrinth, extending a foot or more in diameter, from the royal chamber on every side. Here the nurseries and magazines of provisions commence, and being separated by small empty chambers or galleries, are continued on all sides to the outward shell, and reaching up within it two-thirds or three-fourths of its height. All these chambers, and passages leading to and from them, being arched, help to support one another: and the exterior building supports them on the outside. Our limits will not allow our describing all the subterranean galleries or passages, and the manner in which they are artfully made to communicate with different parts of the building, and to suit the convenience of the labourers and soldiers, as thoroughfares for passing and repassing with their loads of materials and provisions.

There are other nests or habitations constructed by other species, which are in the form of turrets, or upright cylinders, and contain a number of cells: they are of two sizes,

for the accommodation of a larger and smaller species: and again another kind of nests, which is the habitation of a distinct species; this is generally spherical or oval, and built in trees.

Of the three orders above-mentioned, the labourers, which are about one-fourth of an inch long, and twenty-five of them weigh about a grain, are the most numerous; *e. g.* in the *T. bellicosus*, there seem to be at least one hundred labourers to one of the fighting insects or soldiers. The soldiers are about half an inch long, and equal in bulk to fifteen of the labourers: the mouth of the latter is evidently calculated for gnawing and holding of bodies, whereas that of the former, or soldiers, has its jaw shaped like two sharp awls, a little jagged, and as hard as a crab's claws, so that they are incapable of any thing but piercing or wounding: in insects of the third order, which have arrived at their perfect state, the head, thorax, and abdomen, are wholly different from those of the other orders, and they are furnished with four large brownish transparent wings; their length is six or seven-tenths of an inch, and each is equal in bulk to thirty labourers: they have now two eyes which are visible, whereas if they had them before they are not distinguishable. These insects are gathered and eat by the inhabitants, and reckoned both delicious and nourishing food. The king and queen are lodged in apartments, which are closed up, so that a passage remains merely for the ingress and egress of the labourers and soldiers, but at which (as we have already said) neither of the royal pair can come out: and in the business of propagation the abdomen of the female extends to an enormous size, so that an old queen's will be fifteen hundred or two thousand times the bulk of the rest of her body, and twenty or thirty thousand times the bulk of a labourer, and by its peristaltic motion, are protruded eggs to the amount of sixty in a minute, or eighty thousand and more in twenty-four hours: the eggs are removed by the attendants into the nurseries, and after they are hatched, the young are provided with every thing necessary till they are able to shift for themselves. It is remarkable of all the different species of termites, that the working and fighting insects never expose themselves to the open air; but either travel under ground, or within such trees or substances as they destroy, or through pipes made of the same materials with their nests. The termites which build in trees, frequently construct their nests within the roofs and other parts of houses, to which they do considerable damage, unless soon extirpated; and the larger species enter under the foundations of houses, through the floors, or bore through the posts of buildings, making lateral perforations and cavities, as they proceed. They are equally destructive when they get into a trunk containing clothes and other things, and into stores, &c.

Upon opening the hills in which the termites lodge, the behaviour of the soldiers excites admiration. When a breach is made, however quickly it be done, a soldier will run out, and walk about the breach, as if to see whether the enemy is gone, or to examine what is the cause of the attack. He will sometimes return again, as if to give the alarm; but in a short interval he is followed by two or three others, running as fast as they can, and these are followed by a large body, others also succeeding them, as long as any one continues to batter their building: nor is it easy to describe the rage and fury which they manifest on the occasion; biting every thing in their way, and making a vibrating noise, like the ticking of a watch, perceptible at the distance of three or four feet. If they get hold of any one who attacks their habitation, they will in an instant suck out blood enough to weigh against their whole body; and if they chance to wound the leg, the stain upon the stocking will be seen to extend an inch

in width. They make their hooked jaws to meet at the first stroke, nor will they quit their hold, but suffer themselves to be pulled away leg by leg, and piece after piece, without the least attempt to escape. If, however, they are left to themselves undisturbed, they will in less than half an hour retire into the nest, as if they conceived their castle to be secure. Before they all get in, the labourers will be seen in motion, hastening to bring materials for repairing the breach. This they do without mutual obstruction, though their number be immense, and the work is soon finished. While the labourers are thus employed, the soldiers take no part with them. On a renewed attack, the labourers run with celerity into the numerous pipes and galleries with which the building is perforated; and the soldiers rush out as numerous and as vindictive as before. One circumstance more deserves to be mentioned; and that is the loyalty and fidelity displayed by the labourers and soldiers in their attendance on the royal chamber. This chamber is a large nest, is capacious enough to hold many hundreds of the attendants, besides the royal pair, and it is always found full. These faithful subjects never abandon their charge in the last distress, but rather die in their defence than desert them. 'If in an attack upon the hill, you stop short of the royal chamber, and cut down about half of the building, and leave open some thousands of galleries and chambers, they will all be shut up with their sheets of clay before the next morning. If even the whole is pulled down, and the different buildings are thrown together in a heap of confused ruins, provided the king and queen are not destroyed or taken away, every interstice between the ruins, at which either cold or wet can possibly enter, will be so covered, as to exclude both; and if the insects are left undisturbed, in about a year they will raise the building to nearly its pristine size and grandeur.

There is another species, called the *marching* termites, which is much larger, and seems to be less frequent than the other. For an account of those, and many other curious particulars, we must refer to Philos. Trans. vol. lxxi. part i. art. 11. p. 139—192.

TERMIGON, in *Geography*, a town of France, in the department of Mont Blanc, on the Arc; 12 miles E.N.E. of St. André.

TERMINALIA, in *Antiquity*, feasts celebrated by the Romans, in honour of the god Terminus.

Varro is of opinion, that this feast took its name from its being at the term or end of the year; but Festus is of a different sentiment, and derives it from the name of the deity in whose honour it was held.

In reality, the Terminalia, or feasts of land-marks, were held in honour of Jupiter, considered in the capacity of conservator of land-marks or bounds. Dionysius Halicarnassicus tells us, that it was Numa Pompilius who first consecrated land-marks to Jupiter; and adds, that the same prince appointed an anniversary day, on which the country-people, assembling together on the bounds of the lands, should offer sacrifices in honour of the tutelary gods thereof.

The Terminalia were held on the seventh, or, as Struvius will have it, on the tenth of the calends of March. No animal is to be sacrificed herein, it being deemed unlawful to stain the land-marks with blood: they only offered sacrifices of the first fruits of the earth; and this in the open air, and on the spot where the land-marks were.

TERMINALIA, in *Botany*, from the terminal mode of growth and foliation in several of the species, the stem being a striking example of what Linnæus latterly called *determinatè ramosus*, and the leaves being crowded at the ends of the branches, which are swelled in that part.—Linn. Mant. 21. Schreb. Gen. 728. Willd. Sp. Pl. v. 4. 967,

Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 441. Jacq. Coll. v. 1. 130. Juss. 76. Lamarck Illustr. t. 848. (Pamea; Aubl. Guian. 946. Tanibouca; ibid. 448? Badania; Gært. t. 97. Myrobalanus; Gært. ibid. Lam. Illustr. t. 849.)—Class and order, *Polygamia Monoecia*, Linn. Rather *Decandria Monogynia*.

Gen. Ch. *Cal.* Perianth superior, of one leaf, internally coloured, in five ovate, acute, equal segments. *Cor.* Petals none. Nectary pitcher-shaped, composed of five small hairy lobes, in the bottom of the calyx. *Stam.* Filaments ten, awl-shaped, slightly spreading, longer than the calyx, inserted into its lower part; anthers roundish, erect. *Pist.* Germen inferior, ovate-oblong; style thread-shaped, erect, the length of the filaments; stigma simple. *Peric.* Drupa oval, somewhat compressed, acute. *Seed.* Nut oval-oblong, angular, smooth, with an oblong solitary kernel.

Numerous flowers, above the others, and later, are entirely male.

Eff. Ch. Calyx in five segments, internally coloured. Petals none. Nectary five-cleft, hairy. Drupa inferior.

1. *T. Catappa*. Broad downy-leaved Terminalia. Linn. Mant. 128. Willd. n. 1. Ait. n. 1. Jacq. Coll. v. 1. 130. Ic. Rar. t. 197. (Adamaram; Rheede Hort. Malab. v. 4. 5. t. 3, 4.)—Leaves obovate, obtuse, very slightly toothed, destitute of glands at the base; finely downy beneath.—Native of the East Indies, in Java and in woods on the coast of Malabar, where the soil is sandy. Messrs. Lee and Kennedy are said to have introduced this tree into the English stoves in 1778, but it has not yet blossomed, nor, considering its natural and lofty growth, is that event to be expected. The branches grow in a whorled manner; their extremities, clothed with rusty down, bearing each a close tuft of large broad leaves, a foot long, on short downy stalks. Each leaf is tipped with a small point, and is abrupt or somewhat heart-shaped, though much contracted, at the base. Clusters numerous, axillary, stalked, cylindrical, dense, many-flowered. Flowers greenish-yellow, half the size of a currant-blossom, most of them males. Fruit oval, compressed, larger than that of the almond-tree, reddish, with a cylindrical kernel, which tastes like a silberd, but is more tender and soluble. Its oil is said never to turn rancid. The wood is hard and durable, and the tree is much planted about houses, for the sake of its shade.

2. *T. moluccana*. Molucca Terminalia. Lamarck Dict. v. 1. 349. Willd. n. 2. Ait. n. 2. (*T. glabrata*; Forst. Prodr. 74. Pl. Escul. 52. Spreng. Antiq. Bot. 102. t. 2. Catappa; Rumph. Amboin. v. 1. 174. t. 68.)—Leaves obovate, obtuse, entire, destitute of glands at the base; smooth on both sides.—Native of the Molucca and Society isles. Introduced into the English stoves by the earl of Powis, in 1804. This is said to be of a more humble stature than the foregoing, and the leaves are smaller, smooth at the back, though their footstalks are covered with dense rusty down. The specific name of *glabrata* ought to have been retained in preference to *moluccana*. This is considered as a sacred tree in Otaheite, though used in building boats as well as houses.

3. *T. subcordata*. Heart-leaved Terminalia. Willd. n. 3.—“Leaves obovate, obtuse, somewhat wavy; smooth on both sides, heart-shaped at the base, without glands.”—Gathered by Humboldt and Bonpland, in South America. Willdenow, who had examined one of their dried specimens, says “this species is very like the last, but the base of the leaves is heart-shaped, and their margin very slightly and unequally wavy; the footstalks somewhat downy. It differs from *T. Catappa*, in having the leaves somewhat wavy, very smooth,

smooth on both sides, and heart-shaped at the base."—This last character seems to us to exist in *T. Catappa*.

4. *T. latifolia*. Broad wedge-leaved Terminalia. Swartz Ind. Occ. 747. Willd. n. 4. (Arbor maxima, fortè prunifera, cortice cannabino, folio longissimo latissimoque; Sloane Hist. v. 2. 130.)—Leaves obovate, obtuse, somewhat ferrated, smooth on both sides, destitute of glands at the base: their midrib downy beneath.—Native of mountainous woods in the north part of Jamaica. A tall, stout, umbrageous tree, rising to the height of one hundred feet, or more, with horizontal branches, downy when young. Leaves crowded about the ends of the branches, on smooth stalks, thickish, scarcely pointed, bluntly ferrated, or nearly entire, tapering (not dilated or heart-shaped) at the base. Flowers small, whitish or yellowish, in long axillary clusters; the upper ones chiefly male. Fruit pulpy, greenish-red, sweet, boat-shaped, larger than a peach, eaten chiefly by hogs. Its kernel tastes like an almond. The wood is valuable for its hardness. The inhabitants of Jamaica know this species by the name of Broad-leaf Tree. Swartz.

5. *T. Chebula*. Oval-leaved Terminalia. Retz. Obs. fasc. 5. 31. Willd. n. 5. Ait. n. 3. Roxb. Coromand. v. 2. 52. t. 197. (Myrobalanus Chebula; Gärtn. v. 2. 91. t. 97.)—Leaves obovate-oblong, obtuse, entire, opposite, smooth on both sides; silky when young. Footstalks with two glands near the top. Clusters terminal.—Native of hills in the East Indies. Retzius, who received his specimens from Koenig, describes this tree as not more than three or four times the height of a man, with no very widely spreading top. Our specimens, from Dr. Rottler, agree with every particular of his description. The young leaves are beautifully silky. We find none of the marginal glands represented by Roxburgh, nor are our leaves pointed, as in his plate. The flowers in both are yellow, in terminal, often aggregate, clusters. Dr. Roxburgh mentions the wood of the tree he describes as hard and valuable, and the head as evergreen, and widely spreading. The rind of its fruit is much used by painters of chintz for drawing a permanent outline, and by dyers to fix their colours. With salt of steel it makes an excellent ink.

6. *T. elliptica*. Rounded-leaved Terminalia. Willd. n. 6.—“Leaves oblong-elliptical, bluntly rounded, entire; slightly hairy beneath, with two glands at the base.”—Native of the East Indies. The branches are round, brown; downy when young. Leaves two or three inches in length; contracted at the base; very obtuse at the extremity, with a slight point; dark green and smooth above; pale, and besprinkled with close-pressed scattered hairs, beneath; furnished at the base with two cup-shaped, somewhat stalked, glands. Spikes terminal, panicle. Willdenow. We have been inclined to suspect this might not be distinct from the following, but the inflorescence does not agree, nor could Willdenow surely have omitted to notice the great length of the footstalks in *T. Bellerica*.

7. *T. Bellerica*. Long-stalked Terminalia. Roxb. Corom. v. 2. 54. t. 198. (Myrobalanus Bellerica; Breyn. Ic. 18. t. 4. Gärtn. v. 2. 90. t. 97. Tani; Rheede Hort. Malab. v. 4. 23. t. 10.)—Leaves obovate, wavy, smooth. Footstalks about half as long as the leaves, with two glands at the top. Spikes axillary, solitary, hardly longer than the footstalks.—Native of hills in the East Indies. A large tree, with a very widely spreading head; the wood is white, but soft, and not durable. The bark, when wounded, exudes a copious insipid gum, like gum arabic, soluble in water. The leaves are firm and smooth, six or seven inches long when full-grown, but in the flowering season they seem scarcely to exceed their footstalks, which then measure half

that length. Flowers fetid, dirty yellow, in copious axillary spikes, not clusters. Fruit the size of a nutmeg; its kernel eatable, but reported to intoxicate if taken in any great quantity.

8. *T. mauritiana*. Mauritius Terminalia. Lamarck Dict. v. 1. 349. Willd. n. 7. (Badamia Commerfoni; Gärtn. v. 2. 90. t. 97? Pamea guianensis; Aubl. Guian. v. 2. 946. t. 349?)—Leaves lanceolate, slightly crenate, tapering at each end, smooth on both sides. Spikes axillary, the length of the leaves.—Native of the isles of Mauritius and Bourbon, and probably of Madagascar. Commerfoni describes it as the largest and tallest tree of the two former islands. He took it for a new genus, and named it *Refuaria*, under which name, and that of *le faux benjoin*, his specimens are preserved in the Linnæan herbarium. The wood is much esteemed for making canoes. The branches are swelled at the ends, where they bear ample tufts of leaves three or four inches long, on downy stalks, three-quarters of an inch in length; when full-grown both appear, by Lamarck's account, to be much larger. Flowers copious, in simple axillary spikes. Fruit an inch or inch and half long, with a dilated compressed border, not altogether answering to Gärtner's figure, which makes us doubt his synonymy. He has formed his barbarous generic name, *Badamia*, out of the French *Badamier*, which is synonymous with *Terminalia*. Aublet's plate of his *Pamea* greatly resembles our plant, and our chief doubt arises from their distant places of growth. That they are of the same genus cannot be disputed.

9. *T. angustifolia*. Narrow-leaved Terminalia. Jacq. Hort. Vind. v. 3. 51. t. 100. Willd. n. 8. Ait. n. 4. (T. Benzoin; Linn. Suppl. 434. Lamarck Dict. v. 1. 349. Croton Benzoe; Linn. Mant. 297. Willd. Sp. Pl. v. 4. 533.)—Leaves linear-lanceolate, wavy, downy on both sides.—Native of the East Indies. Jacquin reports that seeds of this species were sent him by Lemonnier, under the French name of *Bien-joint*, from the isle of Bourbon. Hence he ingeniously and satisfactorily conjectures, that this appellation, which alludes to the mode of growth of the tree, may have been confounded with *Benjoin* or *Benzoin*, the French word for gum Benjamin, or *Benzoe*, and thus the said gum was supposed to come from the plant before us. (See STYRAX.) *T. angustifolia* has long been cultivated in our stoves, but the flowers are unknown. Its manner of branching is like *T. Catappa*, *mauritiana*, &c. nor does it much differ from the last named, except that the leaves are narrower, often quite linear, and clothed, more or less completely, with brown, rather rigid, hairs. Their veins, rib, and margin are tinged with a blood-colour. The fruit appears to be similar to the last. Linnæus raised a plant from seed in the Upsal stove, and remarked that the seed-leaves were of a blood-red. The leaves of his specimen hardly exceed a line in breadth.

10. *T. Vernix*. Varnish Terminalia. Lamarck Dict. v. 1. 350. Willd. n. 9. (Arbor vernicis; Rumph. Amboin. v. 2. 259. t. 86.)—Leaves linear-lanceolate, entire, smooth on both sides.—Native of the Molucca isles. It is presumed to belong to this genus from the imperfect description of Rumphius, and its evident resemblance to the two last species. The leaves however are more dispersed, and of larger dimensions, being from nine to eleven inches long, and the breadth of three or four fingers, so that they are scarcely to be termed linear-lanceolate. The rib is very prominent beneath. Flowers yellow or whitish, with red stamens, in drooping clusters or spikes. Fruit oblique and compressed, two inches broad. The nut exudes a large quantity of resin, soon turning brown, and a milky resinous fluid is lodged under the bark of the tree, at first of an acrid quality, but

hardening into a valuable varnish, destitute of acrimony, and much used in the Moluccas. A noxious vapour is said to proceed from this tree, so that the natives of the countries where it grows avoid sleeping, or even sitting for any length of time, under its shade. Whether this be the most famous varnish-tree of the Chinese, as Rumphius indicates, may perhaps admit of doubt.

11. *T. Tanibouca*. Guiana Terminalia. (Tanibouca guianensis; Aubl. Guian. 448. t. 178.)—Leaves scattered, obovate, pointed, entire, smooth. Clusters terminal and axillary. Native of marshy places in Guiana. For an account of this species, see TANIBOUCA. Its genus must be very doubtful, unless the fruit were known, but the suggestion of our learned friend Mr. Brown, Prodr. Nov. Holl. v. 1. 351, induces us, for the present at least, to refer the plant hither.

TERMINANDO *et Audiendo*. See AUDIENDO.

TERMINANS, PUNCTUM. See PUNCTUM.

TERMINATION, TERMINATIO, in *Grammar*, the ending of a word, or the last syllable of it.

They are the different terminations of one and the same words on different occasions, that constitute the different cases, numbers, tenses, moods, &c.

TERMINATION *Island*, in *Geography*, an island in the South Pacific ocean, so named by captain Vancouver, as being the termination of his researches on the S.W. coast of New Holland, near which it lies. S. lat.  $34^{\circ} 32'$ . E. long.  $122^{\circ} 8'$ .

TERMINATOR, in *Astronomy*, a name sometimes given to the *circle of illumination*, from its property of terminating the boundaries of light and darkness.

TERMINE, in *Commerce*, a weight for gold, silver, and pearls at Tunis; 8 termini being equal to an ounce; and 80 ounces of Tunis being equal to 81 ounces English troy.

TERMINE, in *Geography*, a town of Naples, in Principato Ultra; 10 miles S.E. of Avellino.

TERMINER, in *Law*. See OYER.

TERMINI, in *Architecture*. See TERMS.

TERMINI, in *Geography*, a town of Sicily, in the valley of Mazara, situated on the north coast, celebrated for the warm baths near it, from which it received its name; 18 miles E. of Palermo. N. lat.  $38^{\circ} 5'$ . E. long.  $13^{\circ} 45'$ .—Also, a river of Sicily, which runs into the Mediterranean, a little to the W. of Termini.

TERMINI. See TERMOLI.

TERMINISTS, TERMINISTÆ, in *Ecclesiastical History*, a sect or party among the Calvinists, whose particular tenets are reducible to five points:

1. That there are several persons, both in and out of the church, to whom God has fixed a certain term before their death, after which he no longer wills their salvation, how long soever they live afterwards.
2. That God has fixed this fatal term of grace by a secret decree.
3. That this term once elapsed, he makes them no farther offer of repentance or salvation, but takes away from his word all the power it might have to convert them.
4. That Pharaoh, Saul, Judas, most of the Jews, and many of the Gentiles, were of this number.
5. That God still bears with several of this sort of people, and even confers benefits on them after the term is expired; but that he does not do it with any intention they should be converted.

All the other Protestants, and particularly the Lutherans, look on these articles with abhorrence, as repugnant to the goodness of God, and destructive to all Christian virtue; and as contrary to Scripture, particularly the following texts, Ezek. xviii. 23. 30, 31, 32. xxxiii. 11. 1 Tim. iv.

1. 16. 2 Pet. iii. 9. Acts, xvii. 30, 31. Matt. xi. 28. Isa. lxvi. 2. Heb. iii. 7. 13. Rom. ii. 5, &c.

TERMINOS, in *Geography*, a lake or bay on the coast of Tabasco, in the bay of Campeachy. N. lat.  $18^{\circ} 12'$ . W. long.  $92^{\circ} 46'$ .

TERMINTHUS, from *τεμινθος*, a pine-nut, in *Surgery*, a large painful tumour, or pustule on the skin, thought to resemble a pine-nut.

TERMINUM, *ad qui praterit*. See AD TERMINUM.

TERMINUM, *Infra, quare ejecit*. See QUARE.

TERMINUS, *τερμυς*, signifies a bound or limit.

TERMINUS, *a quo*, in *Metaphysics*, denotes the place from whence any motion commences: in contradistinction from the other extreme, which is called the *terminus ad quem*.

The schoolmen call privation a *terminus a quo*, in speaking of generation, which they consider as a species of motion.

TERMINUS, in *Mythology*, the god of fields and land-marks. M. de Boze, in a learned dissertation on this subject (Mem. de l'Acad. t. i.), observes, that the Egyptians received from the Hebrews the custom of bounding the fields. In process of time, as the laws established for the security of the land-marks were not a sufficient restraint on avarice, Numa persuaded the people that there was a god who protected land-marks and avenged incroachments. He built a temple to him upon the Tarpeian mount, and regulated the ceremonies of his worship. He caused this god to be represented under the form of a flock or stone, as we learn from Tibullus and Ovid: but afterwards this god was represented with a human body placed upon a pyramidal land-mark. It is said that this god acquired peculiar honour by maintaining his station when the other gods were removed by Tarquin the Proud, for the purpose of building the temple which Tarquin the elder had vowed to erect to Jupiter.

TERMIOVA, in *Geography*, a town of Iltria; 18 miles N.E. of Pedena.

TERMISSUS, or TELMISSUS, in *Ancient Geography*, a town of Asia, in the southern part of Pisidia.

TERMITES, in *Entomology*. See TERMES.

TERMOLI, or TERMINI, in *Geography*, a town of Naples, in the province of Capitanata; the see of a bishop, suffragan of Benevento; 57 miles W. of Vieste. N. lat.  $42^{\circ} 2'$ . E. long.  $15^{\circ} 5'$ .

TERMOR, *Tenuis ex termino*, in *Law*, he that holds lands or tenements for a term of years, or life.

TERMUS, in *Ancient Geography*, a river in the isle of Sardinia.

TERN, in *Geography*, a river of England, which rises in Staffordshire, 5 miles N.E. of Drayton, and runs into the Severn, 7 miles below Shrewsbury.

TERN. See TYRAN.

TERN, in *Ornithology*. See STERNA.

TERN, *Brown*, or *Sterna obscura* of Linnæus, is by some authors called the *brown gull*. Mr. Ray describes it as having the whole under side white, the upper brown; the wings partly brown, partly ash-colour; the head black; and the tail not forked: but Mr. Pennant conjectures, that this bird is the young of the greater tern. See STERNA.

TERN, *Great*, or *Sea-swallow*, *Sterna hirundo* of Linnæus, has the bill and feet of a fine crimson, the former tipped with black, straight, slender, and sharp-pointed; the crown and hind part of the head black; the throat and whole under side of the body white; the upper part, and coverts of the wings, a pale grey; the tail consisting of twelve feathers, the outer edges of the three outmost grey, the rest white, and

the exterior on each side two inches longer than the other, and closed in flying, so as to appear one slender feather.

These birds frequent the sea-shores, banks of lakes, and rivers; they feed on small fish and water insects, hovering over the water, and suddenly darting into it to catch their prey. They breed among small tufts of rushes, and lay three or four eggs of a dull olive-colour, spotted with black. All the birds of this genus are very clamorous. Pennant.

TERN, *Black*, or *Scare-crow*. See STERNA *Filipes*.

TERN, *Surinam*, or *Darter*. See PLOTUS *Surinamensis*.

TERNA, a word used by some authors to express an impetigo.

TERNA, *Folia*, in *Botany* and *Vegetable Physiology*, are leaves, whether simple or compound, sessile or stalked, which grow three together in a whorl, on any stem or branch, as in *Verbena triphylla*, Curt. Mag. t. 367. Such a disposition of the foliage appears to prevail remarkably among the plants of Mexico, Chili, and Peru, of which, besides the example just named, many others may be found. (See the genera FUCHSIA and HEMIMERIS.) Among British plants, *Erica cinerea* has naturally *folia terna*; while the generally opposite leaves of *Lyfimachia vulgaris* and *Lythrum Salicaria* occasionally become so. See LEAF.

TERNALLA, in *Geography*, a town of Hindoostan, in Mysore; 45 miles E. of Rettinghery.

TERNARY MEASURE. See MEASURE.

TERNARY Number, in *Antiquity*, was esteemed a symbol of perfection, and held in great veneration among the ancient mythologists. Whence Virgil,

—“Numero Deus impare gaudet.” Ecl. viii. ver. 75.

Servius on this place remarks, that the Pythagoreans ascribed the ternary number to the Supreme God, as being the beginning, middle, and the end of all things. All the heathen gods had a three-fold power attributed to them, as the *tria virginis ora Dianæ*, the three-forked thunderbolt of Jupiter, the trident of Neptune, the three-headed dog of Pluto. Again, the *Parcæ* were three, the *Furies* three, Hercules was three nights in begetting, the *Muses* were anciently three, the *Graces* three, &c.

This number was likewise used in most religious ceremonies, but especially in lustrations; whence Virgil, *Æn.* lib. xi. v. 188.

“Ter circum accensos, cincti fulgentibus armis,  
Decurrere rogos.”

TERNATA, FOLIA, in *Botany* and *Vegetable Physiology*, are compound leaves, each of which consists of three leaflets, as in the Trefoil and Strawberry. These are called in English Ternate Leaves, and must not be confounded with *Folia TERNA*, see that article, for which last we have no appropriate term in our language. Some plants bear twice, or thrice, ternate leaves. See LEAF.

TERNATE, in *Geography*, an island in the East Indian sea, and the principal, though not the largest, among those called Moluccas or Spice Islands, of a circular form, and about 21 miles in circumference. In the centre is a lofty volcanic mountain, whose base extends almost to the sea every way. The upper parts are uncultivated, and covered over with shrubs and low trees; but in the plain are many gardens, and abundance of fruit-trees. On this mountain are found many hollows or caverns full of sulphur, which emit a thick smoke, and flame sometimes appears from the summit, with a noise resembling thunder. The productions are cocoa-nuts, bananas, yams, oranges, and other fruits; but the principal article of commerce is cloves:

many birds of paradise, and other beautiful birds, are found here, and plenty of game. The chief quadrupeds are goats, deer, and hogs. The boa serpent is sometimes found of the length of thirty feet. This island was first settled by the Spaniards, who were driven away by the Dutch, to whom the king of the island is, in some degree, subject. The Europeans have two forts, called “Orange” and “Terloehé,” between which is a lake, called “Sasse,” three miles in circumference, and 60 fathoms deep, separated from the sea by a narrow dike, which the Spaniards made a fruitless attempt to cut through, to form a port. On this island are three mosques, and a Dutch church, but no place of worship for the Portuguese. The province or government of Ternate includes the islands of Ternate, Tidore, Motir, Machian, and Bachian, which are what are properly the Moluccas; they are the original places of growth of the finer spices; and larger nutmegs are still found in the woods of Ternate, than any other produced out of Banda. Some places, situated in the eastern part of the island of Celebes, belong likewise to this government; and the object of the Company in settling there is principally to furnish provisions for Ternate, that part of Celebes being very fruitful in rice and other necessaries. They also yield a considerable quantity of gold, about 24,000 taels, of a dollar and a half in weight, yearly, amounting, at 5*l.* per tael, to 120,000*l.*, and excellent bird’s-nests, which are esteemed a great delicacy by the Orientals, and especially by the Chinese; in exchange for which the inhabitants take opium, Hindoostan piece-goods, chiefly blue cloth, fine Bengal coffees and hummums, together with some cutlery. Ternate does not, in general, require any supply of provisions from Java, as the isles of Banda do. This island suffered greatly in August 1770, by earthquakes. More than sixty violent shocks were felt in the space of twenty-four hours, and the fortifications were much injured. N. lat. 0° 50'. E. long. 127° 10'.

TERNATE, in *Zoology*, a species of bat. See VAMPIRE, and VESPERTILIO *Vampyrus*.

TERNATEA, in *Botany*, a genus so named by Tournefort, from Ternate, the native country of the plant. See CLITORIA.

TERNAVASSO, in *Geography*, a town of France, in the department of the Po; 6 miles N.E. of Carmagnola.

TERNAY, *Bay of*, a bay or harbour on the E. coast of Chinese Tartary, so called by M. Perouse in 1787. The Dutch navigators called it Port Acquis. N. lat. 45° 13'. E. long. 137° 29'.

TERNBERG, a mountain of Austria, near the river Enns; 6 miles S. of Steyr.

TERNEUSE, a town and fortress of Flanders, situated on the W. branch of the Scheld, called the “Hondt,” begun by the count of Hohenloe, lieutenant of the prince of Orange, in the year 1583, afterwards augmented by the States: the fortifications have been since destroyed; 12 miles S.E. of Flushing.

TERNI, a town of the Popedom, in the duchy of Spoleto, situated between two arms of the Nera, and, therefore, anciently called “Interamnium,” or “Interamna.” It is well built, and the see of a bishop, immediately subject to the pope. Its greatest trade consists in oil, besides which it also reaps considerable advantage from its excellent vineyards. This was the birth-place of the emperors Tacitus and Florianus, and of Tacitus the famous historian. Between six and seven Italian miles from Terni, to the N.W. close by the little town of Cesi, is Mount Eolo, remarkable for its cool breezes, which, especially in summer, issue from the chafms and crevices in the rocks of this mountain; 14 miles S.S.W. of Spoleto. N. lat. 2° 34'. E. long. 12° 37'.

TERNIER, a town of France, in the department of the Lemane; 5 miles S.S.W. of Geneva.

TERNOIS, LE, a river of France, which runs into the Canche, near Hesdin.

TERNOSKAIA, a town of Russia, in the country of the Cossacs, on the Don; 136 miles E.N.E. of Azoph.

TERNOVA, a town of European Turkey, in Bulgaria. This town was anciently one of the strongest in the country, and the residence of the princes; at present it is thinly inhabited, and the fortifications are ruined. It is the residence of an ecclesiastic, who is called the archbishop of Bulgaria; 95 miles E. of Sophia. N. lat. 43°. E. long. 25° 24'.—Also, a town of European Turkey, in Thessaly; large and commercial; on the Peneus; 5 miles W.N.W. of Larissa.

TERNSTROEMIA, in *Botany*, was so called by Linnæus at the suggestion of Mutis, in memory of one of the pupils of the former, named Ternstroem, who having undertaken a voyage to China, in 1745, died at Poulicandor, at an early age. His illustrious teacher has not, as in other instances, given us any account of the voyage, discoveries, or talents of this unfortunate young man, who, though not one of his favourite pupils, deserves commemoration as a martyr to scientific research.—Linn. Suppl. 39. Schreb. 347. Willd. Sp. Pl. v. 2. 1128. Mart. Mill. Dict. v. 4. Swartz Prodr. 81. Juss. 262. (Cleyera; Thunb. Jap. 12. Nov. Gen. 68. Juss. 433. Taonabo; Aubl. Guian. 569. Tonabea; Juss. 262. Tanabea; Lamarck Illustr. t. 456.)—Class and order, *Polyandria Monogynia*. Nat. Ord. akin to *Thea* and *Camellia*. Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, orbicular, concave, rather unequal segments, with two smaller ones closely applied to its base, all permanent and coriaceous. *Cor.* of one petal, bell-shaped, in five deep, orbicular, concave, emarginate segments, longer than the calyx, without any tube. *Stam.* Filaments numerous, awl-shaped, shorter than the corolla, and inserted into its base in a double row; anthers linear, erect, the length of the filaments. *Pist.* Germen superior, roundish; style cylindrical, as long as the stamens; stigma capitate. *Peric.* Berry dry, ovate, smooth, of two cells. *Seeds* about eight, convex on one side, flat on the other.

Ess. Ch. Corolla bell-shaped, in five deep segments, without a tube. Calyx in five deep segments, with two smaller at the base. Berry dry, of two cells.

1. *T. meridionalis*. Mexican Ternstroemia. Linn. Suppl. 264. Willd. n. 1.—Leaves obovate, obtuse, emarginate, entire. Flower-stalks axillary, compressed, recurved. Two outer segments of the calyx orbicular, sharply keeled.—Gathered by Mutis in Mexico and New Granada. A tree, determinately branched; the branches thick, rigid, leafy, nearly round, with a smooth grey bark. *Leaves* alternate, an inch or rather more in length, on short, thick, channelled, purplish footstalks, obovate, or nearly elliptical, peculiarly rigid and coriaceous, single-ribbed, smooth, with a thick somewhat revolute margin; their upper surface often dotted with either prominent or depressed points; the under purplish or rusty, especially when young. *Stipulas* none. *Flower-stalks* numerous, axillary, solitary, half the length of the leaves, very thick and rigid, two-edged, brown or purple, curved downwards, destitute of pubescence, but, in the dried plant at least, wrinkled and uneven. *Flowers* larger than a hawthorn-blossom, white. The two smaller external scales of the calyx furnished with a sharp keel, ending in a minute point; the rest without any keel, thin and membranous at the edge; all smooth, orbicular, coriaceous, permanent. *Corolla* occasionally with six segments, at first

globose, then bell-shaped. *Berry* dry, destitute of valves. *Seeds* silky, deep red. Such is the plant of Mutis. We have no means of ascertaining whether the West Indian one, described by Swartz in his *Observationes*, be the same or not; but he says the *flower-stalks* are terminal, nor does he advert to their clumsy two-edged figure, so different from the rest of the species, that it could scarcely have escaped his notice.

2. *T. elliptica*. Elliptical Ternstroemia, or Rottenbane. Swartz Ind. Occ. 929. Willd. n. 2. Vahl Syn. b. v. 2. 61.—Leaves obovate, obtuse, entire. Flower-stalks lateral, elongated, nearly thread-shaped. Outer segments of the calyx ovate, acute, bluntly keeled.—Native of the West Indies, on the Sulphur mountains of Montserrat and Guadeloupe, as well as in St. Vincent's. It is said to be the pretended Jesuit's bark, mentioned by Labat. This is a *shrub* with stout, round, smooth, dispersed or clustered *branches*, leafy towards their extremities. *Leaves* like the last, but twice as long, and not emarginate; their *footstalks* longer and more slender. *Flower-stalks* an inch and half or two inches long, but slightly drooping or recurved, nearly round, not a quarter so stout as the last, slightly swelling upward, red or purplish. *Flowers* rather larger than the foregoing, yellowish-white, some of them destitute of a pistil. The scales of the calyx are all pointed, the outer ones narrow and ovate, of a smaller proportion than in *T. meridionalis*, and sometimes more than two.

3. *T. japonica*. Japan Ternstroemia. Thunb. Tr. of Linn. Soc. v. 2. 335. Willd. n. 4. (Cleyera japonica; Thunb. Jap. 224. Mokokf; Kämpf. Am. Exot. 873. t. 774.)—Leaves obovato-lanceolate, obtuse, nearly entire. Flower-stalks lateral, somewhat angular. Outer segments of the calyx triangular, pointed, slightly keeled.—Gathered by Thunberg, near Nagasaki in Japan, flowering in autumn. This is a *tree*, smooth in every part. Specimens sent us by the finder are so very nearly akin to the two foregoing species, that it is hard to establish a specific difference between them. The *leaves* of the Japan plant however are rather more lanceolate, and their margin is sometimes, not constantly, crenate towards the point. Their surface is quite smooth, not visibly dotted. The *flower-stalks*, about an inch long, are scattered on the branches, below the leaves, but slightly recurved, usually triangular, not compressed. *Flowers* white, scarcely so large as in *T. meridionalis*. *Style* short and thick. *Berry* the size of a currant, red, pointed, with a white, sweet, subastringent pulp, and, according to Kämpfer, only one pellucid seed.

4. *T. punctata*. Dotted-edged Ternstroemia. Swartz Prodr. 81. Willd. n. 3. (Taonabo punctata; Aubl. Guian. 571. t. 228.)—Leaves elliptic-oblong, dotted at the edge. Flower-stalks axillary, elongated, nearly thread-shaped. Segments of the calyx all pointed.—Gathered by Aublet on the sides of the Serpent mountain in Guiana, bearing flowers and fruit in August and September. A large *tree*, whose *leaves* are bordered with minute glandular points, rough to the touch; their extremity usually emarginate; their length about three inches. *Flower-stalks* slender, about half as long as the leaf with its footstalk. *Stamens* about sixty. *Fruit* ovate, pointed, of five or six cells. Aublet having seen it in an unripe state only, took it for a capsule, but Swartz asserts it to be a *berry*.

5. *T. dentata*. Toothed Ternstroemia. Swartz Prodr. 81. Willd. n. 5. (Taonabo dentata; Aubl. Guian. 569. t. 227.)—Leaves elliptical, pointed, strongly ferrated. Flower-stalks lateral or axillary, single-flowered.—Gathered by Aublet, in the same place as the preceding, and at the same season. A *tree*, whose trunk is twenty-five feet, or more,

in height, and two in diameter, crowned with an ample tuft of spreading branches. The *leaves* are four inches long, and an inch and half or two inches broad, thick, smooth, tapering at each end, beset with tooth-like serratures in the margin. *Footstalks* slender, an inch long. *Flower-stalks* recurved, scattered, hardly an inch in length. *Flowers* yellowish, the size of hawthorn. *Fruit* like the last. The *bark* of the tree is used for tanning leather. The *wood* serves instead of tiles for houses.

6. T? *corymbosa*. Corymbose Ternstroemia?—Leaves opposite, elliptical, pointed, entire. Panicle forked, corymbose, many-flowered, terminal.—Native of Guiana. *Mr. Rudge*. This appears to be most akin to the last in the shape and size of its *leaves*, but differs in their entire margin, and opposite insertion. The three-forked *panicle* is, moreover, a kind of inflorescence unexampled in *Ternstroemia*, and the *calyx* wants the two small external segments. All these circumstances induce a suspicion of the genus, which we have not materials to clear up.

We cannot take leave of *Ternstroemia* without adverting to the mischiefs which arise from the barbarous and unsettled principles of French nomenclature. Jussieu professes to adopt the uncouth names of Aublet, only till the genera of that author are better settled; yet he has tried to soften down *Taonabo* into *Tonabea*, a needless change if the name were not to remain. Lamarck prefers *Tanabea*; so our memories and our indexes would have become burdened with three names instead of one, all intolerable to a classical or literary botanist, if the genus had not happily been superseded.

TEROE, in *Geography*, a town of Bengal; 25 miles E. of Rangur.

TEROUANNE. See THEROUANNE.

TEROWA, a town of the island of Junkfeilon, near the east coast; the usual residence of a Siamese governor or viceroy. Here is a pagoda, with about twenty priests. N. lat. 8° 13'.

TERPANDER, in *Biography*, and *Music of the Ancients*, one of the most renowned musicians of antiquity. It is recorded in the Oxford Marbles, that he was the inventor of characters to express musical sounds in the several genera; which event is placed about six hundred and seventy years before the Christian era. Indeed all writers who mention the progressive state of music in Greece, are unanimous in celebrating the talents of Terpander; but though there is such an entire agreement among them concerning the obligations which the art was under to this musician in its infant state, yet it is difficult to find any two accounts of him which accord in adjusting the time and place of his birth. It does not, however, seem necessary to lead the reader over hedge and ditch with chronologers, after a truth, of which the scent has so long been lost. The Oxford Marbles, which appear to us the best authority to follow, tell us, in express terms, that he was the son of Dendeneus of Lesbos, and that he flourished in the 381st year of these records; which nearly answers to the 27th olympiad, and 671st year B. C. The Marbles inform us likewise, that "he taught the nomes, or airs, of the lyre and flute, which he performed himself upon this last instrument, in concert with other players on the flute." Several writers tell us that he added three strings to the lyre, which before his time had but four; and in confirmation of this, Euclid and Strabo quote two verses, which they attribute to Terpander himself.

"The tetrachord's restraint we now despise,  
The seven-stringed lyre a nobler strain supplies."

If the hymn to Mercury, which is ascribed to Homer, and in which the seven-stringed lyre is mentioned, be genuine, it robs Terpander of this glory. The learned, however, have great doubts concerning its authenticity. But if the lyre had been before his time furnished with seven strings in other parts of Greece, it seems as if Terpander was the first who played upon them at Lacedæmon. The Marbles tell us that the people were offended by his innovations. The Spartan discipline had deprived them of all their natural feelings; they were rendered machines; and whether Terpander disturbed the springs by which they used to be governed, or tried to work upon them by new ones, there was an equal chance of giving offence. The *new strings*, or *new melodies*, and *new rhythms*, upon the old strings, must have been as intolerable to a Lacedæmonian audience, at first hearing, as an organ, and cheerful music would have been, to a Scots congregation some years ago, or would be at a Quaker's meeting now. "It is not at all surprising," says Alcibiades, "that the Lacedæmonians seem fearless of death in the day of battle, since death would free them from those laws which make them so wretched."

Plutarch, in his "Lacænic Institutions," informs us, that Terpander was fined by the ephori for his innovations. However, in his "Dialogue on Music," he likewise tells us, that the same musician appeased a sedition at Sparta, among the same people, by the persuasive strains which he sung and played to them on that occasion. There seems no other way of reconciling these two accounts, than by supposing that he had, by degrees, refined the public taste, or depraved his own to the level of his hearers.

Among the many signal services which Terpander is said to have done to music, none was of more importance than the notation that is ascribed to him for ascertaining and preserving melody, which was before traditional, and wholly dependent on memory. The invention, however, of musical characters has been attributed by Alypius and Gaudenius, two Greek writers on music, and, upon their authority, by Boethius, to Pythagoras, who flourished full two centuries after Terpander. It will be necessary therefore to tell the reader upon what grounds this useful discovery has been bestowed upon him.

Plutarch, from Heraclides of Pontus, assures us that Terpander, the inventor of nomes for the cithara, in hexameter verse, "set them to music," as well as the verses of Homer, in order to sing them at the public games. And Clemeas Alexandrinus, in telling us that this musician wrote the laws of Lycurgus in verse, and "set them to music," makes use of the same expression as Plutarch, which seems clearly to imply a *written melody*. See *Musical GAMES*.

TERPELING, in *Geography*, a town of Thibet; 8 miles S.W. of Painom Jeung.

TERPENTARIA, in *Botany*, a name used by some authors for the betonica aquatica, or great water-figwort, called *water-betony*.

TERPILLUS, in *Ancient Geography*, a town of Macedonia, in Mygdonia. Ptolemy.

TERPONUS, a town of Illyria, belonging to the Japodes, of which Cæsar took possession, according to Appian.

TERPSICHORE, the *Jovial*, as her name imports, in *Mythology*, the name of one of the nine *Muses*, (which see.) This muse is represented on medals and other monuments, by the flutes which she holds in her hands.

TERRA, in *Geography*.

TERRA, in *Chemistry*.

TERRA, in *Natural History*.

} See EARTH.

TERRA *Alana*, a name given to the yellowish-white tripoli.

TERRA *Adamica*, a name given to the alkaline red mould. See ADAMIC Earth.

TERRA *Armenia*. See BOLE.

TERRA *de Baira*, the name given by some to an earth of a white colour, found about Baira, near Palermo.

It is esteemed a very great medicine in the cure of malignant fevers, and in the stopping of hæmorrhages of all kinds. The powder of it is commonly sold in Italy under the name of Claramont-powder; a name it obtained from a person who first found out its virtues, and communicated them to the world in a treatise expressly written on the subject. Boccone, Mus. de Fific.

TERRA *Cariofa*. See TRIPOLI.

TERRA, *Chio*, in the *Materia Medica of the Ancients*, an earth of the marle kind, found in the island of Chio, and given internally as an astringent; but its chief use among them was as a cosmetic, the ladies esteeming it the finest of all things for clearing the skin, and smoothing wrinkles. What title it has to these qualities the world has not of late ages inquired into; but the substance is still in being, and to be had in any quantities from the same place. And the descriptions Dioscorides and Galen have left us of it are so accurate, that there is not the least room to doubt but that the earth now found there, was the very kind they used. It is a dense compacted earth, yet very soft, and of a texture easily disunited and broken by water.

TERRA *Cilicia*. See CILICIA.

TERRA *Cimolia*. See CIMOLITE.

TERRA *Cinolia Purpurascens*. See SOAP-Earth.

TERRA *Coloniensis*. See COLOGNE-Earth.

TERRA *Damnata*. See CAPUT MORTUUM.

TERRA *Foliata Tartari*, foliated earth of tartar, is a name improperly given to a neutral acetous salt, with a basis of fixed vegetable alkali; or to a combination of the acid of vinegar, saturated with the alkali of tartar, or of other vegetable matter. This salt has also been called *regenerated tartar*, because the alkali of tartar is united with an acid, which is in some respects similar to the acid of tartar, but is in others very different.

The terra foliata is made by pouring upon a quantity of alkaline salt of tartar, in a glass cucurbit, a sufficient quantity of good distilled vinegar, at different times, to saturate all the alkali, or even a little more than is necessary for that purpose, till the effervescence entirely ceases. This saturated liquor is to be filtrated and evaporated to dryness, with a gentle heat. The dry salt thus obtained is to be dissolved in spirit of wine, and the solution again evaporated to dryness; by which means a salt is obtained more or less white, of a silky appearance, and composed of small scales or leaves, whence it has been called *foliata*. When the salt is dried, and while it is hot, it must be shut up in a well-closed bottle, because it quickly becomes moist by exposure to air.

When distilled vinegar is poured upon salt of tartar, little or no effervescence is made at first, because a part of the alkaline salt employed is generally caustic, or deprived of its gas, which part unites with the acid preferably to the mild part of the alkali, and absorbs any gas that is extricated from the latter part; and, therefore, till all the caustic part of the alkali be nearly saturated, little or no effervescence can happen. But when more vinegar is added, the effervescence becomes so considerable, that some of the liquor will, without care, flow over the vessel. This effervescence is occasioned by a large quantity of air that is disengaged during the saturation. When the saturation is advanced to a cer-

tain degree, the effervescence diminishes; but the combination of the last portions of the acid and alkali may be facilitated by frequently agitating the liquor, which will renew the effervescence. The taste of the foliated earth is sharp, pungent, a little caustic, and partaking at the same time of the taste of vinegar and that of fixed alkali. It is soluble in spirit of wine, and may be decomposed merely by the action of fire, and from it may be obtained by distillation, a very penetrating and concentrated radical vinegar. It is little used except in medicine. Macquer's Chem. Dict.

Preparations of this kind are given in doses of ten or twenty grains as mild aperients, and to a drachm or two as purgatives and diuretics. Lewis.

TERRA *Goltbergenfis*. See GOLTBERGENSIS Terra.

TERRA *Japonica*. See JAPAN Earth, and CATECHU.

TERRA *Lemnia*. See LEMNIAN Earth.

TERRA *Lignicensis*. See LIGNICENSIS Terra.

TERRA *Livonica*. See LIVONICA Terra.

TERRA *Melia*. See MELIA Terra.

TERRA *Melitensis*. See MELITENSIS Terra.

TERRA *Merita*, in the *Materia Medica*, a name given by some authors to the curcuma, or turmeric-root.

It is from a false pronunciation of this name, *terri merit*, that the English turmeric has its origin.

TERRA *Miscella*. See THRAUSTOMICHTES.

TERRA *Noceriana*. See NOCERIANA.

TERRA *Samia*. See SAMIA Terra.

TERRA *Seleneusiaca*. See SELENEUSIACA.

TERRA *Sigillata*. See SIGILLATA.

TERRA *Sigillata Magni Ducis*. See ETRUSCA Terra.

TERRA *Sigillata Fusca*, a bole of a beautiful brown colour, found in Germany, England, and America.

It is of a dense texture, makes no fermentation with the strongest acids, and if thrown into water, it soon separates into a number of thin flakes.

The Germans give it in fluxes and malignant fevers, being an excellent astringent, and worthy to be introduced into our shops.

TERRA *Silefiaca*, *Silesian Earth*, a fine astringent bole, called by some authors *axungia folis*.

It is very heavy, of a firm compact texture, and in colour of a brownish-yellow. It breaks easily between the fingers, and does not stain the hands, is naturally of a smooth surface, and is readily diffusible in water, and melts freely into a butter-like substance in the mouth; it leaves no grittiness between the teeth, and does not ferment with acid menstrua. These are the characters by which it is known from all other earths of a like colour; it is found in the perpendicular fissures of rocks near the gold-mines at Strigonium, in Hungary, and is supposed to be impregnated with the sulphur of that metal. It is, however that be, a good astringent, and better than most of the boles in use. Hill.

The terra Silefiaca is also called *terra sigillata Strigonienfis*.

TERRA *Sinopica*. See SINOPICA Terra.

TERRA *Solis*, a name given by the German naturalists to a kind of black spongy earth, somewhat approaching to the nature of that English black earth which we call *kellow*, but containing gold. It is not properly an ore of gold, but is an earth into which some small particles of gold have been washed from some other place, and there detained. A good microscope will discover these particles in the richer pieces of the earth, and they are bright and pure, though very small: the earth is found in fissures of the other strata, not in any beds or strata of itself. It is not to be had in any great quantity, nor does it contain any large portion of gold.

TERRA *Strigonienfis*. See STRIGONIENSIS Terra.

TERRA *Turcica*. See *TURCICA Terra*.

TERRA *Virginæ Aureæ*, in *Natural History*, the name of a medicinal earth, mentioned by Boccone.

It is found at a place called Sancto Paolo, in the state of Modena; and is thence sent to Venice, and many other places, where it is esteemed a very famous medicine.

Its great use is in hæmorrhages of all kinds; but it is also given with success in malignant fevers. Boccone, *Mus. de Fific.*

TERRA *Viridis*. See *TERRE Vert.*

TERRA *Umbri*. See *UMBER*.

TERRA *Zoica*, a name given to the alkaline red mould, called also Adamic earth.

TERRA *Peita*, in *Law*. See *SUMMONS*.

TERRA, in our *Ancient Law-Books*, occurs in the sense of land, or ground, joined with divers additions; as,

*Terra Normannorum*, the lands of such Norman noblemen as were forfeited to the crown, by the owners taking part with the French king against Henry III. *Terra frusca*, such land as had not been lately ploughed. *Terra gilliflorata*, land held by the tenure of paying a gilliflower yearly. *Terra vestita*, land sown with corn, and the crop still remaining thereon. *Terra testamentalis*, land held free from feudal services, and devisable by will. *Terra culta*, land that is tilled and manured, in contradistinction to *terra inculta*. *Terra affirmata*, land let out to farm. *Terra dominica*, or *indominica*, demesne land of a manor. *Terra hydatica*, was land subject to the payment of hydage. *Terra lucrabilis*, land that may be gained from the sea, or enclosed out of a waste or common to particular uses. *Terra wainabilis*, tillage-land. *Terra wareta*, fallow-land. *Terra boscalis*, wood-land, &c.

TERRA *Extendenda*, is a writ directed to the escheator, &c. ordering him to inquire and find out the true yearly value of any land, &c. by the oath of twelve men, and certify the extent in chancery.

TERRA or *Tierra Australis del Espiritu Santo*, in *Geography*, an island in the South Pacific ocean, and the most westerly as well as the largest of those called *New Hebrides*: discovered by Quiros, and visited by captain Cook in the year 1774; 22 leagues long, 60 miles in circuit, and 12 in breadth. The land of it, especially the west side, is exceedingly high and mountainous: and in many places the hills rise directly from the sea. Except the cliffs and beaches, every other part is covered with wood, or laid out in plantations. Besides the bays of St. Philip and St. Jago, the isles which lie along the south and east coast cannot, in the opinion of captain Cook, fail of forming some good bays or harbours. S. lat. 14° 40' to 15° 40'. E. long. 166° 45' to 167° 32'.

TERRA *Firma* is sometimes used for a continent, in contradistinction to islands.

Thus Asia, the Indies, and South America, are usually distinguished into terra firmas and islands.

TERRA *Firma*, in a more restricted sense, denotes an immense extent of country under the authority and government, direct or indirect, of the crown of Spain, comprehending several extensive provinces, and three audiences, fixed at Panama, Quito, and Santa Fé de Bogota: the large provinces are Terra Firma Proper, Popayan, Quito, and New Granada, all of which are again subdivided into several smaller provinces or jurisdictions.

TERRA *Firma*, or *Tierra Firmé*, in a still more confined sense, comprises three districts in the viceroyalty of New Granada, *viz.* Darien, Panama or Tierra Firmé Proper, and Veragua.

TERRA *Firma*, or *Tierra Firmé*, *Proper*. See *PANAMA*.

TERRA *del Fuego*, a large island, separated from the southern extremity of America by a narrow sea, called the "Straits of Magellan:" so named from the volcanoes observed on it. Capt. Cook was the first navigator who had the honour, from a series of the most satisfactory observations, beginning at the W. entrance of the Straits of Magellan, and carried on with unwearied diligence round this island, through the strait of Le Maire, to construct a chart of the southern extremity of America. The south-west coast of Terra del Fuego, says this distinguished navigator (*Second Voyage*, vol. ii. p. 199, &c.) "with respect to inlets, islands, &c. may be compared to the coast of Norway; for I doubt if there be an extent of three leagues where there is not an inlet or harbour, which will receive and shelter the largest shipping. The worst is, that till these inlets are better known, one has, as it were, to fish for anchorage. There are several lurking rocks on the coast; but happily none of them lie far from land, the approach to which may be known by sounding, supposing the weather so obscure that you cannot see it. For to judge of the whole by the parts we have founded, it is more than probable that there are soundings all along the coast, and for several leagues out to sea. Upon the whole, it is by no means the dangerous coast it has been represented. The currents between Cape Desada and Cape Horn set from west to east, that is, in the same direction as the coast; but they are by no means considerable. To the east of the cape, their strength is much increased, and their direction is north-east to Staten Land. They are rapid in Strait le Maire, and along the south coast of Staten Land, and set like a torrent round Cape St. John, where they take a north-west direction, and continue to run very strong both within and without New Year's Isles. While we lay at anchor within this island, I observed that the current was strongest during the flood; and that on the ebb its strength was so much impaired, that the ship would sometimes ride head to wind, when it was at west and west-north-west. This is only to be understood of the place where the ship lay at anchor; for at the very time we had a strong current setting to the westward, Mr. Gilbert found one of equal strength near the coast of Staten Land setting to the eastward; though probably this was an eddy current or tide."

Most writers who have mentioned the island of Terra del Fuego, describe it as destitute of wood, and covered with snow. The latter circumstance may occur (see Hawkesworth's *Voyages of Cook*, &c. vol. ii.) in winter. And by those who saw it at that season, it might be conceived to be without wood. Lord Anson was there in the beginning of March, answering to our September; but Capt. Cook was there in the beginning of January, corresponding to our July; and thus we may account for their different statements. We fell in with it, says Cook, about 21 leagues W. of the strait of Le Maire, and trees were visible with glasses; and though upon approaching it patches of snow were discoverable, yet the sides of the hills and the sea-coast appeared to be covered with a beautiful verdure. The hills are lofty, but not mountainous, though their summits are quite naked. The soil in the vallies is rich, and of a considerable depth; and at the foot of almost every hill there is a brook, the water of which has a reddish hue, but it is not ill-tasted. The most remarkable land in Terra del Fuego is a hill, in the form of a sugar-loaf, which stands on the W. side, not far from the sea; and the three hills, called the "Three Brothers," about nine miles W. of Cape St. Diego, the low point that forms the entrance of the strait of Le Maire. (See *Le MAIRE*.) In his

his second voyage, Capt. Cook, desirous of coasting the S. side of Terra del Fuego, round Cape Horn, to the strait of Le Maire, reached the W. coast of the island Dec. 17, 1774, and having continued to range it till the 20th, came to an anchor in a place which he called "Christmas Sound." Through the whole course of his navigations, he had never seen so desolate a coast. It seems to be entirely composed of rocky mountains, without the least appearance of vegetation. These mountains terminate in horrible precipices, the craggy summits of which spire up to a vast height; so that scarcely any thing in nature can appear with a more barren and savage aspect than the whole of the country. But barren and dreary as the land is about Christmas Sound, it was not wholly destitute of accommodations. Near every harbour our navigator found fresh water, and wood for fuel. The country abounds likewise with wild fowl, and particularly with geese: which, with their Madeira wine, enabled them to keep a cheerful Christmas. The inhabitants of Terra del Fuego were found by Capt. Cook to be of the same nation which he had formerly seen in Success Bay, and the same with those denominated by M. de Bougainville "Pecharas." They are a little, ugly, half-starved, beardless race, and go almost naked: but it is their own fault that they are not better clad, as nature has furnished them with ample materials for that purpose. By lining their seal-skin cloaks with the skins and feathers of aquatic birds, by making the cloaks themselves larger, and by applying the same materials to different parts of clothing, they might render their dresses much more warm and comfortable. But while they are doomed to exist in one of the most inhospitable climates on the globe, they have not sagacity enough to avail themselves of those means of adding to the conveniences of life, which Providence has put into their power. The captain, after having witnessed many varieties of the human race, pronounces the Pecharas to be the most wretched. Those on the S. are said to be uncivilized, treacherous, and barbarous; while those on the opposite side are represented as simple, affable, and perfectly harmless. The tents which they inhabit are made of poles, disposed in a conical form, covered with skins, or the bark or leaves of trees. The country, though barren, abounds with a variety of unknown plants, for exciting the curiosity of the botanist. The extent of Terra del Fuego, and consequently of the straits of Magellan, was ascertained by Cook to be less than had been laid down by the generality of navigators: nor was the coast, upon the whole, found to be so dangerous as it has been represented: the winter was also remarkably temperate. The sea-lions and sea-bears, the shags and penguins on the coast, are abundant, and intermix, like domestic cattle and poultry in a farm-yard, without attempting to molest one another. Eagles and vultures were seated on the hills among the shags in perfect tranquillity. Sir Joseph Banks, Dr. Solander, and some others, landed here in the month of January 1769, which is the time of summer in that part of the globe, notwithstanding which, two of the company fell a sacrifice only by sleeping one night, and Dr. Solander himself hardly escaped. S. lat.  $52^{\circ} 30'$  to  $55^{\circ} 35'$ . W. long.  $51^{\circ} 20'$  to  $58^{\circ}$ .

TERRA *Magellanica*. See PATAGONIA.

TERRA *Niwa*, a bay in Hudson's Bay. N. lat.  $62^{\circ} 4'$ . W. long.  $67^{\circ}$ .

TERRA *dos Fumos*, a tract of country on the S.E. of Africa, N. of Natal.

TERRA *Nova*, a sea-port town of Sicily, in the valley of Noto, situated in a gulf or bay of the Mediterranean, founded about the middle of the 13th century, by the em-

peror Frederick II. near the site of the ancient Gela. The number of inhabitants is about 700; 50 miles W. of Syracuse. N. lat.  $37^{\circ}$ . E. long.  $14^{\circ} 10'$ .—Alfo, a river of Sicily, which runs into the sea on the S. coast. N. lat.  $37^{\circ}$ . E. long.  $14^{\circ} 10'$ .

TERRA *Nuova*, a town of the island of Sardinia, situated in a bay of the Mediterranean, at the bottom of which is the harbour, built on the ruins of Civita, an ancient episcopal town; 57 miles E.N.E. of Sassari. N. lat.  $40^{\circ} 52'$ . E. long.  $9^{\circ} 40'$ .—Alfo, a town of Etruria; 14 miles N.W. of Arezzo.

TERRA *del Palucci*, a town of Sicily, in the valley of Mazara, on the site of the ancient Pelinus.

TERRA *Vecchia*, a town of Naples, in Calabria Citra; 2 miles S. of Cariati Nuovo.

TERRA *à Terra*. Gallies and other vessels are said to go terra à terra, when they never go far from the coast.

The phrase is also applied, in the manege, to horses that make neither curvets nor balotades, but run smoothly on the ground in a pressed gallop, only making little leaps or risings with the fore-feet.

The gallop is the foundation of the terra à terra, for in these two motions the principle of the action is the same, since the terra à terra is only a shortened gallop with the croupe in, and the haunches following in a close and quick time. And as the mezar is higher than the action of terra à terra, and lower than that of curvets, it may be concluded that the terra à terra is the foundation of the mezar, as well as of curvets.

In the terra à terra the horse should be more together than in the gallop, that he may mark his time and cadence more distinctly; although in a true terra à terra there are no times to be marked, for it is rather a gliding of the haunches, which comes from the natural springs in the limbs of a horse.

When a horse works terra à terra, he always ought, as in the gallop, to lead with the legs that are within the volte, his two fore-feet being in the air, and the moment they are coming down, his two hind feet following. The action of the gallop is always one, two, three, and four; the terra à terra is performed upon two lines and in two times.

To work a horse terra à terra upon large circles, take care to keep the body straight, steady, and true in the saddle, without leaning to one side or the other. Lean upon the outward stirrup, and keep the outward leg nearer the side of the horse than the other leg, taking care to do it so as not to be perceived. If you go to the right, keep your bridle-hand a little on the outside of the horse's neck, turning your little finger up without turning your nails at the same time; although, if need be, you must turn them in order to make the inner rein work which passes over the little finger. Keep your arms and elbows to your hips; by this means you will assure and confine your hand, which ought to accompany, and, as it were, run along the line of the circle with the horse. Berenger's Art of Horsemanship, vol. ii. c. 17.

The term is also applied by the French to dancers, who cut no capers, nor scarcely quit the ground.

And hence, also, it is figuratively applied to authors, whose style is low and creeping.

TERRACE, in *Gardening*, is a sort of raised bank of earth, &c. regularly formed in an oblong manner to any length, broad enough to admit of a spacious level walk at top, and elevated considerably above the level of the general surface; having the sides uniformly sloped, and laid with grafs, and the top formed into a flat or level, sufficiently broad

broad for a grass or gravel walk of proportionable width; designed in gardens as a high, airy walk, to command a better prospect of the adjacent places around, within and without the garden occasionally, as well as to enjoy the fresh air in summer more freely. In the former style of laying out gardens, it was considered as very ornamental, but is at present much in disuse.

It may be remarked, that the height of a terrace-walk may be more or less, as the situation admits, as from one foot to one or two yards, or even three or four yards or more in particular situations; and where there is plenty of earthy materials, rubbish, &c. to form it, allowing breadth in proportion, from five to ten or twenty feet or more, and extended to any length required. They are sometimes formed on some naturally high rising ground, to save as much trouble as possible in bringing stuff from a distance; and sometimes raised wholly of forced materials. But the situation for a terrace may be varied as the natural situation of the place may require.

In respect to form, they should always be broader at the base than the top, and extend lengthways to any distance required; having the sides regularly sloped, of more or less acclivity, as the width, height, and situation admit. Sometimes both sides are sloped, and sometimes only one side, the other perpendicular, and faced with a substantial wall, &c. or formed against the side of a hill, or some naturally rising ground, being finished always broad enough at top to admit of a proper walk. In some naturally elevated situations, terraces are sometimes formed one above another, in two or more ranges, each having its separate side slopes, and elevated walk; in all of which the slopes are to be neatly laid with grass, and the walk at top occasionally of grass or gravel.

The entrances leading to terrace-walks were formerly sometimes formed by an easy acclivity of a grass or gravelled slope, and sometimes by a grand flight of stone steps. Where a rising ground of considerable elevation naturally presents itself in a proper situation, it is an eligible opportunity for forming a terrace with the least expence and trouble, on account of its not requiring the addition of so much earth and rubbish, as when raised entirely on a perfect level, wholly of made earth. Where there are any excavations of ground intended to form ha-has, pieces of water, &c. the excavated earth may be employed in forming terraces, &c.

In the business of forming a terrace, the base must be staked out wider than the intended width at top for the walk, in order to admit of the ascent of slopes being moderate. And the whole of the made earth and rubbish must be well rammed and rolled down from time to time as it is applied, in order to render the whole equally firm, that it may not settle irregularly after being finished. The slopes may either be laid with turf, or sown with grass-seeds; but the first is much the best method, where it can be employed. See **GRASS Ground**.

Terraces are now but little attended to, and, of course, but seldom employed in modern ornamental gardening, as they are mostly considered as having a too stiff and formal appearance, and as not constituting that sort of neatness and tasteful elegance, which is so much esteemed and admired at present in all sorts of works of the garden kind.

**TERRACE, Counter**, is a terrace raised over another to join two grounds, or raise a parterre.

**TERRACE** is also applied to the roofs of houses that are flat, and on which one may walk; as also to balconies that project.

The terrace is properly the covering of a building which

is in platform; as that of the peristyle of the Louvre, or that of the observatory, paved with flint and mortar. All the buildings of the Oriental nations are covered with terraces, to take the fresh air on, and even to lie on. See **PAVEMENT of Terrace**.

**TERRACE, or Terras**, used for mortar. See **TARRACE**.

**TERRACINA**, in *Geography*, a town of the Papedom, in the Campagna di Roma, situated in a very fruitful but marshy country, which makes the air unwholesome. This town was anciently the capital of the Volsci, and named Anxur. The Greeks called it Trachyna, corrupted into Terracina. In the year of Rome 348, it was taken and plundered by Fabius Ambustus; and in 424 was made a Roman colony. Being built on a rock, in the reign of Tiberius 20,000 persons were killed by the fall of a theatre. It is now a poor place. It had once a harbour: but that is choked up; near Terracina are considerable fragments of the Via Appia, made from Rome to Capua by Appius Claudius Coccus, and begun by him while censor, in the year of Rome 440: this road was paved with hard stone of various sizes, but uniformly twelve inches in thickness; and was wide enough for two carriages; 47 miles S.E. of Rome. Near this place was a fountain of Neptune, the water of which was said to be fatal.

**TERRADEGLIAS, or TERRADELLAS, DOMENICO**, in *Biography*, a native of Barcelona, in Spain; but who went early into Italy, where he studied music at Naples under Durante, as an accomplishment; but was reduced, by accidents in his family, to practise it as a profession.

He began to flourish about 1739, when he composed the opera of "Astarto," and part of "Romolo," in conjunction with Latilla, for the Teatro delle Dame, at Rome.

In the latter end of the year 1746 he came to England, where he composed two operas, "Mithridates" and "Bellerophon." But unfortunately for the composer, none of the fingers of this time stood high in the favour of the public. Yet his opera of "Mithridates," we well remember, received much applause, as music, distinct from what was given to the performers. And his compositions, when executed in Italy by fingers of the first class, acquired him great reputation.

Besides the favourite songs in the two operas just mentioned, which are printed by Walsh, Terradellas himself, while he was in England, published a collection of twelve Italian airs and duets in score, which he dedicated to lady Chesterfield. In these he seems less masterly and original than in his other productions: that have come to our knowledge. In the songs he composed for Reginelli, a very learned singer in ruin, we find boldness and force, as well as pathos. And some *arie di bravura* of his composition, for the celebrated tenor singer Babbì, at Rome, abound with fire and spirit. If his productions are compared with those of his contemporaries, his writings, in general, must be allowed to have great merit; though his passages now seem old and common. This composer having spent his youth in Catalonia, was not regularly initiated into the mysteries of counterpoint in any Neapolitan conservatorio, having been placed under Durante, for a short time, only as a private scholar; and we think we can sometimes discover in his scores, through all his genius and elegance of style, a want of study and harmonic erudition.

Terradellas was remarkable, not only for attending, in every situation of the finger, to the spirit of the drama which he had to compose, but for giving good music to bad fingers, and not *under-writing*, as Mr. Bayes calls it; the inferior parts of his theatrical pieces. Indeed, it has always appeared to us, that an exquisite finger who can command

attention by the mere tone of his voice, and who requires only a *canevas*, or outline, to colour at his pleasure, is in less want of artificial and captivating composition, than an ordinary singer, who is neither possessed of voice nor taste sufficient to interest the audience. And Terradellas seems to have written all his songs for performers of abilities; for his airs are never made easy and trivial in order to spare the singer. Jomelli's pen always flowed with this spirit; for he never rejected a passage that presented itself, because it would be difficult and troublesome in the execution; but this freedom of style, twenty years ago, might be more safely practised than at present: for it is well known, that a company of singers is now reckoned good, in Italy, if the two first performers are excellent; and an opera is sure to please if two or three airs and a duct deserve attention; the audience neither expecting nor attending to any thing else. And the managers, who find this custom very convenient, take care not to interrupt play or conversation by the useless and impertinent talents of the under-singers; so that performers of the second or third class are generally below mediocrity.

He died at Rome in 1751, of grief and mortification, for the failure of an opera which he had composed with more care and hopes of success than usual.

**TERRÆ** *Ager, Amittere, Aratrum, Aratura, Denariatus, Legem, Lex, Librata, Obolata, Quadrantata, Quadrugata, Trinoda, and Uncia.* See the several articles.

**TERRÆ Filius**, son of the earth, a student in the university of Oxford, formerly appointed in public acts to make jesting and satirical speeches against the members of them, and to tax them with any growing corruption, &c.

**TERRÆ Oleum.** See OIL of the Earth.

**TERRÆJEBIN.** See TERENJABIN.

**TERRAGE**, or **TERRAGIUM**, anciently signified a service, in which a tenant or vassal was bound to his lord, to plough and reap the ground for him.

Others will have it to have been money paid for digging or breaking the ground in fairs and markets.

“*Quieti sint de thelonio, pavagio, passagio, lastagio, tallagio, carvagio, prisagio, et terragio.*”

**TERRAIGNOL**, in the *Manege*, a horse that cleaves to the ground, that cannot be made light upon the hand, that cannot be put upon his haunches, that raises his fore-quarters with difficulty, that is charged with shoulders, and, in general, one whose motions are all short, and too near the ground.

**TERRAIN**, is the manege ground, upon which the horse makes his pisse, or tread.

**TERRANTONA**, in *Geography*, a town of Spain, in Aragon; 8 miles S.E. of Ainsa.

**TERRANUOVA**, a town of Naples, in Calabria Citra; 9 miles N. of Bisignano.

**TERRAON**, or **TORRAON**, O, a town of Portugal, in Alentejo; 24 miles N.W. of Beja.

**TERRAPOUR**, a town of Hindoostan, in Baglana; 32 miles N. of Baskeen.

**TERRAQUEOUS**, compounded of *terra* and *aqua*, earth and water, an epithet given to our globe or earth, considered as consisting of land and water, which together constitute one mass.

Some philosophers, particularly Dr. Burnet, charge the frame and fashion of the terraqueous globe as rude, unartful, and disorderly, and conclude it highly absurd to suppose it came thus out of the hands of the Creator; and, therefore, have recourse to the deluge for making it thus.

But others can perceive much art and conveniency, even

in this apparent disorder: Dr. Derham particularly observes, that the distribution of land and water is admirable; the one being laid over the other so skilfully through all the world, that there is a just equipoise or balance of the whole globe. Thus the Northern ocean balances the Southern, and the American continent is a counterpoise to the European, African, and Asiatic.

And what some may object, that the waters occupy too great a part of the globe, which they imagine would be of more use if it were dry land, he obviates, by shewing that this would deprive the world of a due quantity of vapours and rain; for if the cavities which contain the sea and other waters were deeper, though the quantity of water were the same, and only the surface less and narrower, the evaporations would be so much the less, inasmuch as they are made from the surface, and consequently are in proportion to it.

**TERRAR.** See **TERRIER**.

**TERRAS.** See **TERRACE** and **PAVEMENT**.

**TERRAS**, *Marble.* See **MARBLE**.

**TERRASSE**, LA, in *Geography*, a town of France, in the department of the Here; 13 miles N.N.E. of Grenoble.

**TERRASSON**, JOHN, *Abbé*, in *Biography*, a man of letters, was born at Lyons in 1670, and sent by his father, who was a very religious man, to the house of the Oratory in Paris; but the son, quitting this congregation, and disapproving his father's views, incurred his resentment, so that he was left with a very moderate pittance. However, the abbé Bignon procured him admission into the Academy of Sciences in 1707: he soon became a member; and in 1721, professor of Greek and Latin in the Royal College. Under the famous system of Law, he acquired temporary opulence, but was soon again reduced to penurious circumstances. He then retired from the world, studying and exercising that philosophy which raised him above it. He died at Paris in 1750, at the age of 80 years. His works are, “*A Critical Dissertation on Homer's Iliad;*” “*Reflections in favour of Law's System;*” “*Sethos,*” a moral romance; “*A Translation of Diodorus Siculus,*” 7 vols. 12mo. with preface, notes, and fragments. It was one of Terrasson's sayings, “*What is the most credulous of all things? Ignorance. What is the most incredulous? Ignorance.*”

*Andrew Terrasson*, the elder brother of the former, a priest of the Oratory, was a celebrated preacher, and died at Paris in 1723. His “*Sermons,*” in 4 vols. 12mo. were published in 1726, and reprinted in 1736.

*Gaspard Terrasson*, another brother, and priest of the Oratory, was more celebrated as a preacher than the former, and officiated at Paris during five years. Having incurred persecution, he quitted the pulpit and the congregation of the Oratory. He died at Paris in 1752. His “*Sermons,*” in 4 vols. 12mo. appeared in 1749. His anonymous work, entitled “*Lettres sur la Justice Chretienne,*” was censured by the Sorbonne.

Another person of the same family, *viz. Matthew Terrasson*, was born at Lyons in 1669, studied the law, and pleaded causes with great reputation. He was for some time an associate in the “*Journal des Sçavans,*” and also censor royal. He died, much esteemed, at Paris, in 1734. A “*Collection of his Pleadings, &c.*” was published in 4to.

The son of the preceding, *Anthony Terrasson*, was born at Paris in 1705, brought up to the bar, and excelled in jurisprudence. By order of chancellor d'Aguefseau, he composed a “*History of Roman Jurisprudence,*” with a collection of Ancient Contracts, &c. in fol. 1750. In 1760 he was promoted to the chancellorship of Dombes, and died in 1782. He was the author of “*Melanges d'Histoire, de*

Liter-

Literature, de Jurisprudence, de Critique, &c." 1768; and of other works. Moreri. Nouv. Dict. Hist. Gen. Biog.

TERRASSON, in *Geography*, a town of France, and seat of a tribunal, in the department of the Dordogne; 18 miles N.E. of Montignac. N. lat.  $45^{\circ} 7'$ . E. long.  $1^{\circ} 23'$ .

TERRAUBE, a town of France, in the department of the Gers; 4 miles S.W. of Lectoure.

TERRÉBONNE, a town of Canada; 12 miles N.N.W. of Montreal.

TERREGLES, a town of Scotland, in the county of Dumfries; 2 miles W. of Dumfries.

TERREL, a town of North Carolina; 30 miles N. of Greeneville.

TERRELLA, *μικρον γη*, *little earth*, is a magnet turned of a just spherical figure, and placed so as that its poles, equator, &c. do exactly correspond with those of the world.

It was thus first called by Gilbert, as being a just representation of the great magnetic globe we inhabit.

Such a terrella, if nicely poised, and placed in a meridian like a globe, it was supposed, would be turned round like the earth in twenty-four hours by the magnetic particles pervading it; but experience has shewn this to be a mistake.

TERRE-PLEIN, in *Fortification*, the top, platform, or horizontal surface of the rampart, on which the cannon are placed, and the defenders perform their office.

It is thus called as lying level, having only a little slope outwardly to bear the recoil of the cannon.

It is terminated by the parapet on that side towards the champaign; and by the inner talus on that side towards the place. Its breadth is from 24 to 30 feet.

TERRESCHOW, in *Geography*, a town of Bohemia, in the circle of Pilsen; 16 miles N.E. of Pilsen.

TERRESSA, one of the Nicobar islands, about fifteen miles long, and from two to five broad, of an oval form. N. lat.  $8^{\circ} 20'$ . E. long.  $93^{\circ} 36'$ .

TERRESTRIAL BIRDS. See BIRDS.

TERRESTRIAL GLOBE. See GLOBE.

TERRESTRIAL LINE. See LINE, *Terrestrial*.

TERRESTRIAL PARADISE. See PARADISE.

TERRESTRIAL ROADS. See ROAD.

TERRE-TENANT, is he who has the actual possession of the land, otherwise called the occupant. See TENANT and OCCUPANT.

Thus a lord of a manor having a freeholder, who letteth out his freehold to another to be occupied, this occupier who has the actual possession is called the *terre-tenant*.

TERRE-VERTE, in the *Colour-Trade*, the name of a green earth much used by painters, both singly for a good standing green, and in mixture with other colours.

The name is French, and signifies *green earth*.

It is an indurated clay, of a deep blueish-green colour, and is found in the earth, not in continued strata or beds, as most of the other earths are, but in large flat masses of different sizes, imbedded in other strata; these break irregularly in the cutting, and the earth is generally brought out of the pit in lumps of different sizes. It is of a fine, regular, and even structure, and very hard. It is of an even and glossy surface, very smooth to the touch, and in some degree resembling the morochthus, or French chalk, but adhering firmly to the tongue. It does not stain the hands in touching it; but being drawn along a rough surface, it leaves an even white line, with a greenish cast.

It does not ferment with acids, and is burnt to a dusky brown colour.

It is dug in the island of Cyprus, and in many parts of France and Italy. That from the neighbourhood of Verona has been used to be esteemed the best in the world; but

of late there has been some dug in France that equals it. There is also an earth dug on the Mendip hills, in the sinking for coals, which, though wholly unobserved, is nearly, if not wholly, of equal value.

When scraped, and the finer parts separated, it is ready to be made up with oil for the use of the painters, and makes the most true and lasting green of any simple body they use. Hill and Da Costa. See BERG-GRUEN and VERDITER.

TERRIAGULLY, in *Geography*, a town of Bengal; 20 miles N.W. of Rajemal.

TERRIAH, a town of Hindoostan, in Rohilcund; 7 miles S. of Berelily.

TERRIER, or TERRAR, in our *Ancient Customs*, a collection of acknowledgments of the vassals or tenants of a lordship, containing the rents, services, &c. they owe their lord, and serving as a title or claim for demanding and executing the payment of them.

At present, by terrier we mean no more than a book or roll, in which the several lands, either of a private person, or of a town, college, church, &c. are described. The terrier should contain the number of acres, and the site, boundaries, tenants' names, &c. of each piece or parcel. See DOMESDAY.

TERRIER also denotes the lodge or hole which foxes, badgers, rabbits, &c. dig themselves under ground, and in which they save themselves from the pursuit of the hunters. Hence,

TERRIER, *Terrarius*, is also used for a kind of little hound to hunt those animals, which, like a ferret, creeps into the ground, and by that means affrights and bites them; either tearing them with his teeth, or else haling them by force out of their holes. See DOG and HOUND.

TERRIER, in *Geography*, a town of Africa, on the Senegal; 25 miles S. of Cayar.

TERRIER ROUGE, a town of the island of St. Domingo; 15 miles E.S.E. of Cape Français.

TERRIFICATIO, a word used by some chemical writers to express the coalition of the earthy particles of some bodies after fermentation, or during the time of it.

TERRILS or TYRELLS *Pafs*, in *Geography*, a post-town of the county of Westmeath, Ireland; 40 miles W. from Dublin.

TERRIMUNGALUM, a town of Hindoostan, in the Carnatic; 25 miles N. of Tritchinopoli.

TERRIORE, a town and fortrefs of Hindoostan, in the Carnatic; 24 miles N. of Tritchinopoli. N. lat.  $11^{\circ} 12'$ . E. long.  $78^{\circ} 45'$ .

TERRIS *Bonis et Catallis, Rehabendis post Purgationem*, in *Law*, a writ for a person to recover his lands, goods, or chattels formerly seized, after having cleared himself of a felony, upon suspicion of which he was convicted, and delivered to his ordinary to be purged.

TERRIS *et Catallis Tentis ultra debitum levatum*, a writ judicial for the restoring lands or goods to a debtor, who is distrained beyond the quantity of the debt. See DISTRESS.

TERRIS *Liberandis*, a writ lying for a man convicted by attain, to bring the record and process before the king, and take a fine for his imprisonment, and deliver him his lands and tenements again, and release him of the strip and waste.

It is also a writ for the delivery of lands to the heir after homage and relief performed; or upon security taken that he shall perform them.

TERRITORY, DISTRICT, the extent or compass of land within the bounds, or belonging to the jurisdiction of any state, city, or other division. See DISTRICT.

It is a maxim, that the church has no territory, *i. e.* it has

## TERRITORY.

no temporal jurisdiction; and therefore an ecclesiastical judge cannot arrest any body, not even a priest. It is much in this sense that Cujas says, the church has an auditory, but no territory.

**TERRITORY or District of Columbia**, in *Geography*, a district of America, ceded to the United States by those of Maryland and Virginia, and established in the year 1800 as the seat of general government. It is beautifully situated on both sides of the Potowmack river, between  $38^{\circ} 48'$  and  $38^{\circ} 59'$  N. lat., and  $7'$  E. and  $7'$  W. long. from Washington, the capital. The capital is about  $77^{\circ} 0'$   $22''$  W. from London. It is bounded on the N.E., S.E., and partly N.W., by Maryland; and on the S.W., and partly N.W., by Virginia: in extent it is ten miles square, and contains an area of 6400 square miles. The face of the country is elegantly variegated, and affords a great number of beautiful prospects, of which the Potowmack river is the leading feature. This district affords a variety of streams and springs for watering the city, and for other purposes: its rivers are the Potowmack or Potomac, the Tiber creek, Reedy creek, Rock creek, and Four-mile Run. The soil is thin and sandy, but susceptible of improvement: and the climate is discriminated by a variable spring, a pretty warm summer, an agreeable autumn, and a variable, often very cold, winter.

*Topographical Table.*

Counties.	Population.
Washington city - - - - -	8208
Georgetown, situated W. of the city - - -	4948
Washington county, exclusive of the city and Georgetown - - - - -	2315
Alexandria, on the W. bank of the river, in the lower part of the district - - - - -	7227
Alexandria county, exclusive of the town - - -	1325

Morse and Melish. See COLUMBIA and WASHINGTON.

**TERRITORY, Illinois**, a territory of America, and likely to become soon one of the most important states in the Union, is situated between  $37^{\circ}$  and  $41^{\circ} 45'$  N. lat., and  $10^{\circ} 15'$  and  $14^{\circ} 15'$  W. long. from Washington city; and is bounded on the N. by the North-west territory, on the S. by Kentucky and Missouri territory, on the E. by Indiana territory, and on the W. by Missouri territory. Its extent from N. to S. is 306 miles, and from E. to W. 210 miles: its area contains 50,000 square miles, or 32,000,000 acres. The aspect of the country is level in the south, and to the north elevated and hilly, but not mountainous. The soil is generally fertile, and produces grain, grafs, fruit, flax, and hemp; and in the southern part, cotton. The climate is temperate and agreeable.

*Topographical Table.*

Counties.	Population.	Chief Town.
* Edward.		
* Johnson.		
* Madison.		
Randolph - - - - -	7275	Kaskaskia - 622
St. Clair - - - - -	5007	
* Wabash.		
	12282	

\* Laid out since last census. Melish. See ILLINOIS.

**TERRITORY, Indiana**, an interesting country of America, lately distinguished by this appellation, and now considered as a *nineteenth state*, is situated between  $37^{\circ} 45'$  and  $41^{\circ} 52'$  N. lat., and  $7^{\circ} 40'$  and  $10^{\circ} 47'$  W. long. from Washington city; and bounded on the N. by Michigan territory, lake

Michigan, and North-west territory, on the S. by Kentucky, on the E. by Ohio, and on the W. by Illinois territory. Its extent from N. to S. is 240 miles, and from E. to W. 138 miles. Its area contains 34,000 square miles, or 21,760,000 acres. The aspect of the country is hilly, but not mountainous; its scenery rich and variegated; and it abounds with plains and large prairies. Its rivers are the Ohio, Wabash, White-water, Tippecanoe, Illinois, and St. Joseph's: its minerals are coal, lime-stone, free-stone, salt, and silver. The soil is generally rich and fertile; and its produce grain, grafs, and fruit, and in the south, cotton. Its climate is temperate, pleasant, and salubrious. Its legislature consists of a house of representatives and senate; the former elected annually, and the latter every three years: they must hold no office of profit when elected. The executive consists of a governor and lieutenant-governor; both elected for three years, and capable of being re-elected once: the former has a compensation of 1000 dollars *per annum*, and the latter two dollars *per day*, while the legislature is in session. Its judiciary administration is composed of a supreme and circuit court: the former composed of three judges, appointed by the governor and senate for seven years; with a salary not exceeding 800 dollars *per annum*: the latter consists of a presiding judge and two associates, who hold courts in each county: the presiding judge appointed by the joint ballot of the legislature for seven years, and the associates elected by the people for seven years: sheriffs, clerks, and justices, are elected by the people; the sheriff for three years, the clerks and justices for seven years. The militia officers are elected by those who are subject to military duty; and all above colonel, by the commissioned officers. A state bank is to be established at the seat of government, with one branch for every three counties; and the branch banks must have 30,000 dollars in specie each, before they begin to act. Involuntary slavery is for ever excluded. The constitution may be amended in 12 years: Corydon is to be the seat of government for nine years. The congress, in erecting the Indiana territory into a state, appropriated, in addition to the school section, an entire township of land for the support of a seminary of learning, and four sections for fixing the seat of the state governor.

*Topographical Table.*

Counties.	Population.	Chief Towns.
Clark - - - - -	5760	Jeffersonville 239
Dearborn - - - - -	7310	Lawrenceburg 165
* Franklin.		
* Gibson.		
Harrison - - - - -	3595	Corydon.
* Jefferson.		
Knox - - - - -	7945	Vincennes 670
* Switzerland - - - - -	-	Vevay.
* Washington.		
* Wayne.		
	24520	

\* Laid off since last census. Melish. See INDIANA.

**TERRITORY, Michigan**, a district in America, which, in 1796, was denominated Wayne county, has lately been erected into a territorial government, and organized with the usual offices and powers. It is situated between  $41^{\circ} 45'$  and  $45^{\circ} 35'$  N. lat., and  $5^{\circ} 5'$  and  $8^{\circ} 18'$  W. long. from Washington; and is bounded on the N. by the straits of Michilimackinac, on the S. by Ohio and Indiana, on the E. by lakes Huron and St. Clair, and Upper Canada, and

## TERRITORY.

on the W. by lake Michigan. Its extent from N. to S. is 234 miles, and from E. to W. 138 miles. Its area contains 27,000 square miles, or 17,280,000 acres. The central part of this territory is high, and from this is a descent in all directions.

The rivers are St. Mary's, Huron, Detroit, Black, Maramee, Grand, Carrion, Raisin, &c. The soil is generally rich and fertile, and produces wheat, oats, barley, rye, corn, potatoes, fruit, &c. The climate is temperate and salubrious; winter lasting from the middle of November to the middle of March.

### Topographical Table.

Districts.	Population.	Chief Town.
Detroit - - -	2227	Detroit - 770
Erie - - -	1340	
Huron - - -	580	
Michilimackinac -	615	
	4762	

Morfe and Melish. See DETROIT.

TERRITORY, *Mississippi*, an improving country of America, which, it is presumed, will be divided into two states, the Tombigby being the boundary. It is situated between 30° 15' and 35° N. lat., and 8° and 14° 32' W. long. from Washington city; and bounded on the N. by Tennessee, on the S. by Louisiana, West Florida, and the gulf of Mexico, on the E. by Georgia, and on the W. by Louisiana and Missouri territory. Its extent from N. to S. is 312 miles, and from E. to W. 324 miles; and its area comprehends 89,000 square miles, or 56,960,000 acres. Its general aspect is, towards the south, level, to the north, elevated and beautifully diversified, and on the north-east are some spurs of the Alleghany mountains. The soil, generally good, and in many places excellent, produces cotton, corn, rice, wheat, rye, oats, some sugar, and indigo. The climate is much commended; the winters being mild, and the summers not warmer than several degrees to the northward.

### Topographical Table.

Counties.	Population.	Chief Towns.
Adams -	10002	Natches 1511
Amite -	4750	Liberty.
Baldwin -	1427	
Claiborne -	3102	Gibsonspport.
* Clarke.		
Franklin -	2016	Franklin.
* Green.		
Jefferson -	4001	Greenville.
Madison -	4699	
* Marion.		
* Monroe.		
Warren -	1114	Warren.
Washington -	2920	Fort Stoddart.
Wayne -	1253	
Wilkinson -	5068	Woodville.
	40352	

Melish. See MISSISSIPPI.

TERRITORY, *Missouri*, an improving country of America, which may probably be subdivided into distinct states, is situated between 26° and 49° 37' N. lat., and 12° and 49° 30' W. long.; and bounded on the N. by an unsettled

country, on the S. by Louisiana and the gulf of Mexico, on the E. by Upper Canada, the North-west territory, Illinois territory, Kentucky, Tennessee, Mississippi territory, and Louisiana, on the W. by the Pacific ocean, and on the S.W. by the Spanish internal provinces. Its extent from N. to S. is about 1380 miles, and from E. to W. about 1680 miles; and its area contains 1,580,000 square miles, or 1,011,200,000 acres. The aspect of the country, southward, is level, in many places overflowed by rivers; to the north, elevated, swelling out into large hills; and to the north-west and west, very lofty mountains. The rivers of the territory are the Mississippi, Missouri, Kansas, Grand, Osage, Maramee, St. Francis, White, Arkanfaw, Wachitta, Red, Sabine, Moines, Rio Colorado, Rio Bravos de Dios, Rio Guadalupe, Rio del Norte, &c. Its minerals are abundant, particularly lead, the mines of which near St. Genevieve are extensive and valuable. The soil is various in quality, but much of it is rich and fertile; and produces grain, grafs, fruit, cotton, and some sugar and indigo. The climate is, in the south, warm, in the middle temperate, to the north and west cold; on the Pacific ocean temperate.

### Topographical Table.

Districts.	Population.	Chief Towns.
Cape Girardeau -	3888	Cape Girardeau.
New Madrid - -	2103	New Madrid.
St. Charles - -	3505	St. Charles - 450
St. Louis - - -	5667	St. Louis - 1600
St. Genevieve -	4620	St. Genevieve.
Settlements of Hope } Field and St. Francis }	188	
Ditto on Arkanfaw -	874	
	20845	

Melish. See MISSOURI.

TERRITORY, *North-West*, an extensive territory of America, not yet organized into a regular government, is situated between 41° 45' and 49° 37' N. lat., and 7° and 18° 50' W. long. from Washington city; and bounded on the N. by Upper Canada and lake Superior, on the S. by Indiana and Illinois territory, on the E. by Upper Canada and lake Michigan, on the W. and S.W. by Mississippi river, which divides it from the Missouri territory. Its extent from N. to S. is about 360 miles, and from E. to W. 456 miles; and its area contains about 147,000 square miles, or 94,080,000 acres. The face of the country is generally undulating, in some places hilly, but not mountainous. Its rivers are the Mississippi, Ouifconfin, Fox, Mononomie, Chippeway, &c. The soil is mostly excellent; and the climate, towards the south, is pleasant, and to the north, cold. Few settlements have yet been made in this extensive region, and the inhabitants were not included in the last census. Melish.

TERRITORY of *Orleans*. See LOUISIANA, ORLEANS, and UNITED STATES.

TERROR. The effect of terror, or of sudden frights, in diseases, is often very great.

It is generally observed, that people who are most afraid of the plague in time of contagion, catch the infection soonest; and that those who are most terrified and disheartened at first in the disease, generally die of it. It is indeed uncertain, whether this be attributed to the terror, or whether the terror itself, as a consequence of dejection of spirits, be not merely a symptom of the disease. Kerkring, Spiceler, Anat.

Sudden frights, in acute diseases, have evidently killed many,

many, by the agitation into which they have thrown the spirits, already too much disorderd. We have also accounts of persons absolutely killed by terrors, when in perfect health at the time of receiving the shock from them: people ordered to be executed, but with private orders for a reprieve, have expired at the block without a wound.

The general effects of terror are a contraction of the small vessels, and a repulsion of the blood in the large and internal ones; hence proceed the suppression of perspiration, the general oppression, trembling, and anguish of heart and lungs overcharged with blood, &c.

When a person is affected with terror, the principal endeavour should be to restore the circulation to its due order, to promote perspiration, and to allay the agitation of the patient. For these purposes he may drink a little warm liquor, as chamomile tea, &c.; the feet and legs may be put into warm water, the legs rubbed, and the chamomile tea repeated every six or eight minutes; and when the skin is warm, and there is a tendency to perspiration, sleep may be promoted by a gentle opiate.

TERRYA, in *Geography*, a town of Bengal; 30 miles S. of Beyhar.

TERSA, a small river of Russia, which runs into the Medveditza, in the country of the Cossacs. N. lat.  $50^{\circ} 30'$ . E. long.  $44^{\circ} 34'$ .

TERSCHUEREN, a town of Guelderland; 7 miles E. of Amersfort.

TERSEKAN, a river of Russia, which runs into the Isehim, N. lat.  $52^{\circ} 50'$ . E. long.  $67^{\circ} 34'$ .

TERSCHIZ. See TURSHISH.

TERSION, TERSIO, formed of *tero*, I wear, the act of wiping or rubbing a thing. See ABRASION.

TERTA, in *Ancient Geography*, a town situated, according to Ptolemy, in the interior of Thrace, between Sardica and Philippolis.

TERTHRON, a word properly signifying the extreme part of the sail-yard in shipping. Hippocrates uses it in a metaphorical sense, to express the extremity of a disease.

TERTIAN, in *Medicine*, a species of intermitting fever, of which the similar paroxysms occur at an interval of about forty-eight hours. See FEVER.

TERTIAN is also an old measure, containing eighty-four gallons, so called because it is the third part of a tun. 1 R. III. c. 13. 2 H. VI. c. 11.

TERTIANARIA, in *Botany*, a name given by some authors to the scutellaria, or hooded willow-herb. J. Bauhin, vol. iii. p. 435.

TERTIARY CANONS. See CANONS.

TERTIAS, a word used very frequently in the writings of physicians, with the addition of *ad*; but it is capable of a double signification. *Ad tertias* is often used to express how far the liquor is to be boiled away in the medical decoctions; yet it may in this case signify either the boiling to two-thirds, or to one-third part, of the whole. The more usual sense, however, is to boil away one-third part of the original liquor; and in the same manner to fill a vessel *ad tertias*, does not signify to fill a vessel one-third part full, but two-thirds, leaving only one empty.

TERTIATE, in *Gunnery*. To *tertiate* a great gun, is to examine the thickness of the metal at the muzzle, whereby to judge of the strength of the piece, and whether it be sufficiently fortified or not.

This is usually done with a pair of calliper compasses.

The term is also applied to any piece of ordnance for finding whether it has its due thickness at the vent, trunnions, and neck; if the trunnions and neck are in their due order, and the chase straight, &c.

TERTII *internodii pollicis extensor*, in *Anatomy*. See EXTENSOR.

TERTIO *adjacente*, *Propositio de*. See PROPOSITION.

TERTIVERI, in *Geography*, a town of Naples, in Capitanata; 7 miles N.W. of Troja.

TERTIUM SAL, a *third salt*, a term used in *Chemistry* to express a salt resulting from the mixture of an acid and an alkali, which partakes so of the nature of both, as to be itself neither acid nor alkali, but neutral.

TERTRE, JOHN BAPTIST DU, in *Biography*, a missionary and writer of history, was born at Calais in 1610: and having served in the army in early life, he joined the Dominicans at Paris, and made his profession in 1635, assuming the name of John-Baptist instead of James. About five years afterwards, he was sent as a missionary to the French American islands, where he collected materials for the work which engaged his attention after his return to France in 1658: that was his "*Histoire Generale des Antilles habitées par les François*;" 4 vols. 4to. 1667—71. After having filled various posts in the houses of his order, he died at Paris in 1687. Moreri.

TERTUA, in *Geography*, a town of Hindoostan, in Bahar; 34 miles E. of Bahar.

TERTULLIAN, QUINTUS SEPTIMIUS FLORENS TERTULLIANUS, in *Biography*, generally reckoned the most ancient Latin father extant, was born at Carthage, not long after the middle of the second century. He was the son of a proconsular centurion, or military officer under the proconsul of Africa, and well acquainted with the Roman laws, though he does not seem to have practised the law as a profession. He was also intimately conversant with the Greek and Roman poets, historians, orators, and philosophers, and other heathen writers of every description. His skill in Greek was so considerable, that he wrote several books in that language. It has been inferred from his parentage, and from some expressions in his works, that he was once a Heathen; but the time and circumstances of his conversion to Christianity are not known. Cave supposes that he embraced Christianity about the year 185, and was made a presbyter of the church of Carthage about the year 192. According to Du Pin, he flourished chiefly from about the year 194 to 216. Tillemont is of opinion that he was born in 160, and that he died about the year 245, when he was between 80 and 90 years of age, having lived, as St. Jerom says, to an extreme, or decrepit, old age. Cave conjectures that he died about the year 220. It is said that he was married, probably after his conversion to Christianity. Having been a member of the Catholic church for many years, he separated from it and became a Montanist, as Cave says, about the year 199, but about 205, according to Tillemont. Different accounts have been given of this change; but the most probable seems to be, that the specious pretences of the Montanists to greater mortification in fasts and continence had an influence on his temper, which was severe. But whatever might have been his reasons for adopting the principles of Montanism, they seem to have made so little alteration in him as an author, that there are several of his pieces, concerning which it is not easy to determine, whether they were written by Tertullian a Montanist, or Tertullian still a Catholic. Although, in consequence of this change, his reputation sunk in the church, yet it produced no separation between him and other Christians, except in point of discipline, which, agreeably to his temper, he wished to be harsh and rigorous. His doctrine remained the same with that of the Catholics. In process of time, however, he believed the divine inspiration of Montanus and his two prophetesses, Priscilla and Maximilla, and that they were thus enabled to make further discoveries than

had before been made, for the greater perfection of Christians. He approved of the longer, more strict, and more frequent fasts of the Montanists; he condemned all second marriages; and denied that the church was authorized to receive again into communion any who were chargeable with fornication, adultery, or any such offences, after baptism. He often arrogantly calls his own people spiritual, and the Catholics, as contemptuously, animal or carnal. We have already observed that his knowledge was extensive; his fancy also was lively; and though his temper was severe, and his mode of expression vehement and positive, yet his writings frequently manifest unaffected humility and modesty. The character given of his style by Lactantius must be universally allowed; that it is "rugged and unpolished, and very obscure;" and yet, as Cave observes, "it is lofty and masculine, and carries a kind of majestic eloquence along with it, that gives a pleasant relish to the judicious and inquisitive reader." His books still extant, though many are lost, are numerous, some of which were written before and others after he embraced the errors of Montanism. Of these, the Apology is reckoned his principal work; and has been highly commended both by ancient and modern writers; whilst his other performances are written with wit and force, and are edifying and instructive. The time when his "Apology" was written has been differently stated by various authors: some refer it to the year 200, others to 203 and 205; but Mosheim, after laborious examination, concludes that it was composed in the year 198. All allow that it was written before he joined the Montanists. Learned men generally agree, that it was not addressed to the senate of Rome, but to the governors of provinces, or perhaps to the proconsul of Africa, and the chief magistrates residing at Carthage, where it was written, according to Lardner; though others are of opinion that it was written at Rome. From this Apology, it appears that Christians underwent a variety of grievous sufferings; they were, as he says, "crucified, hung upon stakes, burnt alive, thrown to wild beasts, condemned to the mines, and banished into desert islands." That this was the case, appears also from Tertullian's book to the proconsul Scapula, not written before the year 211 or 212. The "Apology" is written for the purpose of shewing the injustice of the persecutions inflicted upon Christians, and the falsehood of the charges brought against them; and likewise to display the excellence of the Christian religion, and the folly and absurdity of that of the Heathens. His two books "Ad Nationes" are connected with his Apology, and indicate his characteristic vehemence. His address to Scapula, already mentioned, was written under the emperor Caracalla, and contains an avowal of admirable principles. "It ought," he says, "to be left to the free choice of men, to embrace that religion which seems to them most agreeable to truth. No one is injured or benefited by another man's religion; it is not an act of religion to force religion, which ought to be adopted spontaneously, not by compulsion." He proceeds to vindicate the conduct of Christians, and to shew that their religious principles induced them to pay entire obedience to the emperors, and that therefore they did not deserve to incur the penalties of treason. Another work of Tertullian has been often cited, *viz.* "De Præscriptionibus adversus Hæreticos." In this work he treats of heresy in general, and then discusses particular heresies in his five books against Marcion, in others against Praxeas, in defence of the Trinity, and against Hermogenes, and the Valentiniens. In his book "On the Soul," he inquires into the nature of the soul and its properties. In his treatise "On Baptism," he absurdly maintains that the moral stain of the soul is effaced by the external washing of the body, and that punishment is likewise remitted; a doctrine

which some late divines have zealously supported. Baptism by heretics he considers as no baptism, and contends that it ought to be repeated. In cases of necessity, he thinks infant-baptism to be allowable, but he recommends deferring rather than hastening the administration of this sacrament. His book "On Penance" refutes the opinion advanced by the Montanists, that sins committed after baptism cannot be absolved by the church. In his treatise "On Idolatry," he extends this crime to practices that are almost unavoidable in society; such as bearing arms for the defence of the empire, adorning houses in honour of the prince, and using customary expressions that have any reference to Heathen mythology. In his work "De Corona Militis," he applauds a Christian soldier who refused to place a crown or garland on his head. In another work he considers "flight in time of persecution" as prohibited, and also giving money to escape it. In his treatise "De Spectaculis," he dissuades Christians from attending public shows. In his moral tracts is an exhortation to "patience," in which, as well as in a discourse addressed to martyrs or confessors, he dwells in an eloquent strain on the motives which should bind a Christian to the practice of that virtue. After his union with the Montanists, Tertullian wrote four books in opposition to the discipline of the Catholic church; *viz.* "On Modesty," "On Monogamy," "An Exhortation to Charity," and "A Treatise on Faith."

Tertullian, in his various writings, has afforded plain testimonies to all the books of the New Testament, commonly received by Christians at this time, except the Epistle of James, the 2d of Peter, the 2d and 3d of John. The Epistle to the Hebrews he ascribes to Barnabas. This ancient father has been much admired: Cyprian calls him "my master." Some persons, however, have doubted whether he has done more good or harm in the Christian church. His character is judiciously appreciated by one of his biographers (Gen. Biog.) in the following manner. Tertullian "was certainly a man of lively parts and large acquisitions, of copious invention, and warm feelings. In his reasonings, however, he displayed more fancy and subtilty than sound judgment; and the ardour of his temper inclines him to violence and exaggeration, while a propensity to superstition renders him weakly credulous and gloomily austere." His works have been frequently printed both separately and collectively. Of his whole works, the editions of Rigaltius, fol. Paris, 1641, and of Semler, Hal. Magd. 6 vols. 1770—76, are most esteemed. Dupin. Lardner. Mosheim.

TERVEERE, in *Geography*. See VEERE.

TERUEL, a town of Spain, in the kingdom of Aragon, at the conflux of the Guadalavir and the Alhambra; the see of a bishop, suffragan of Saragossa: it is defended by a citadel. This town was destroyed by the Moors, and lay a long time abandoned, but was rebuilt and repopled by Alphonso II. in the year 1171. In the year 1365, on the 25th of April, it was taken and pillaged by Peter, king of Castile; in memorial of which, the inhabitants keep the day a strict fast; 72 miles S. of Saragossa. N. lat. 40° 32'. W. long. 1°.

TERVIS, a town of Istria; 8 miles W. of Mitterburg.

TERUM, a town of Arabia, in Yemen; 35 miles W.S.W. of Schibam.

TERUNCIUS, in *Antiquity*, a very small brass coin in use among the Romans.

The inconvenience of such very small pieces being soon found, the teruncius became disused, but its name is still retained in reckoning, and thus it became a money of account.

The teruncius at first was a quarter of the *as*, or libra; hence,

hence, as the *as* contained twelve ounces, the *teruncius* contained three, whence the name, which is formed of the Latin *tres uncie*.

*Teruncius* was also used for the quarter of the *denarius*, so that when the *denarius* was at ten asses, the *teruncius* was worth two and a half; and when the *denarius* was risen to fifteen, the *teruncius* was worth four. See *DENARIUS*.

*TERVOLA*, in *Geography*, a town of Sweden, in the Lapmark of Kemi; 116 miles N. of Kemi.

*TERWALDE*, a town of Holland, in the department of Guelderland; 12 miles S. of Hattem.

*TERZA*, LA, a town of Naples, in the province of Otranto; 13 miles S.E. of Matera.

*TERZA*, Ital. the 3d in *Music*. The *terza maggiore*, or major 3d, is four semitones, or half notes, above the base; the *terza minore*, or minor 3d, is three. See *CONCORDS* and *INTERVALS*.



Tartini has added the above, and even given us a 3d found to discords.

“The same thing will happen if the same intervals are sounded by two players on the violin, distant from one another about twenty-nine or thirty feet; always using a strong bow, and holding out the notes. The auditor will hear the third found much better, if placed in the middle between them, than if nearer to one than the other. Two hautbois produce the same effect placed at a much greater distance, and even when the hearer is not in the middle, and still more if he is.”

Tartini has been unfairly treated by d’Alembert, M. Serre, and other French writers, who not only dispute his system built on the *terzo suono*, his own discovery, but give the discovery itself to another.

D’Alembert accuses him of writing in a manner so obscure, that it is impossible to form any judgment of his intentions; yet he is obliged to own that the subject itself is obscure, metaphysical, and uncertain. As to the obscurity in the phenomenon itself, we deny it; the third found, produced by two other sounds, we have always found, from innumerable experiments with two voices, two instruments, two sounds on one instrument, as double stops on a violin, violoncello, and on an organ, that the third found thus produced in the medium was the true fundamental base, such as Tartini himself has expressed by musical notes.

D’Alembert and all the French writers on the subject, have stated the case (except Rousseau) in a disingenuous manner. Even when disputing Rameau’s principles, they wish to keep him above Tartini and all foreign claimants to original discovery or improvement in music. Rousseau is envied for being the first to abuse the old French music, even by those who thought and allowed it to be bad in their other writings. See the Abbé Arnauld and M. Suard’s critique upon his *Dictionnaire de la Musique*, with those of the Abbé Rouffier, M. Laborde, &c. &c.

*TERZO*, in *Geography*, a town of France, in the department of the Tanaro; 2 miles S.W. of Acqui.

*TERZOLA*, in *Botany*, a name by which some authors have called the eupatorium cannabinum, or water hemp-agrimony.

*TERZOWITZ*, in *Geography*, a town of Bohemia, in the circle of Rakonitz; 7 miles S.S.E. of Rakonitz.

*TERZETTO*, in the *Italian Music*, a little tune or air in three parts. See *TRIO*.

*TERZINI*, Ital. implies, in the language of practical musicians, triplets, or three notes in the time of two.

*TERZO SUONO*, Ital. the third found, discovered by Tartini to be produced in the medium by two sounds that can be sustained, and which third found is the true fundamental base. Upon this harmonic phenomenon Tartini has founded his system; and Mr. Stillingfleet, in his “Principles and Power of Harmony,” describes the *terzo suono* in the following manner.

“Two sounds being given on any musical instrument, which will admit of being held out for any time, and of being strengthened at pleasure, as in the trumpet, the German horn, the violin, hautbois, &c. a third found will be heard. On the violin, let the notes C E, C\* E, B E, B G, Bb G, be sounded with a strong bow, the third sounds will be heard in the following manner.

*TESA*, in *Ancient Geography*, a town of Asia, in Carmania, upon the gulf Paragon. Ptolemy.

*TESAKON*, in *Geography*, a town of Africa, in the country of Nalus, on the Nuno Tristao.

*TESCAPHE*, in *Ancient Geography*, a town of Asia, in Mesopotamia, on the banks of the Tigris, near Seleucia. Ptol.

*TESCHAR*, in *Geography*, a town of Hindoostan, in Lahore; 42 miles E.S.E. of Bullaupour.

*TESCHEN*, a principality of Silesia, bounded on the N. by the principality of Ratibor, on the E. by Poland, on the S. by Hungary, and on the W. by Moravia. It is for the most part hilly, the Moravian chain terminating near Jablunkau, in the southern part, where also begin the Carpathian mountains. On the other hand, the north part is very swampy, and overrun with lakes and meres; notwithstanding which, there are several fertile spots. Besides which, it abounds likewise in wood. In the whole principality are five towns, part of the inhabitants of which speak German, and the others Polish. The mountains are inhabited by Walachians, who make good heyducks, or foot-soldiers. The excellent fire-arms here, called *Teschins*, receive their name from this country, and more particularly from its capital, where they are made in great quantities.

*TESCHEN*, or *Teiffin*, a town of Silesia, which gives name to a principality, situated on the Elfa, partly in a valley, and partly on a hill, and surrounded by a morass. It contains a Roman Catholic and a Lutheran church, a college, and four convents. The inhabitants carry on some commerce in leather, wool, and wine: here is a manufacture of fire-arms, and a particular kind of fusil, called, from the town, *Teschins*; 26 miles S.E. of Ratibor. N. lat. 49° 43'. E. long. 18° 41'.

*TESCHENAU*, or *TESCHNA*, a town of Bohemia, in the circle of Bechin; 8 miles E. of Sobieslaw.

*TESCHONOVITZ*, a town of Prussia, in Oberland; 18 miles E.S.E. of Ortelsberg.

*TESCUCCO*. See *TEZCUCCO*.

*TESCYLETIUM*, in *Ancient Geography*, a town of Italy, on the coast of Magna Græcia, between the temple of

of the Lacinian Juno and the town of Locri, according to Diodorus Siculus.

TESE, in *Geography*. See TEST.

TESEGDELT, a town of Morocco, situated on a sharp rock, supposed to be impregnable; 80 miles W.N.W. of Morocco.

TESENI, a town of Asiatic Turkey, in Natolia; 34 miles S.E. of Degnizlu.

TESEREN, a town of Africa, in the country of Tafilet; 50 miles N.N.W. of Tafilet.

TESHOO-LOOMBOO, or LUBRONG, the residence of the Teshoo Lama, and the capital of that part of Thibet immediately subject to his authority, is situated in N. lat.  $29^{\circ} 4' 20''$ . E. long.  $89^{\circ} 7'$ . It is a large monastery, consisting of three or four hundred houses, the habitations of the Gylongs, or priests, besides temples, mausoleums, and the palace of the sovereign pontiff; in which is comprised also the residence of the regent, and of all the subordinate officers, both ecclesiastical and civil, belonging to the court. It is included within the hollow form of a high rock, and has a southern aspect. Its buildings are all of stone, none less than two stories high, flat-roofed, and crowned with a parapet rising considerably above the roof, composed of heath and brush-wood, inserted between frames of timber, which form a ledge below, and are fashioned above into a cornice, capped with masonry. The building is stained of a deep garnet-colour; a custom universally adopted in these regions, for distinguishing places of religious establishment, and which, when contrasted with the white walls, produces, in the appearance of their town, a very pleasing effect. All the houses have windows, the centre, or principal one, projecting beyond the walls, and forming a balcony: they are closed with black mohair curtains instead of shutters. The principal apartment in the upper story has an opening over it, covered with a moveable shed, which serves the purpose of sometimes admitting light and air, and in the winter season, occasionally, the grateful warmth of the sun. The tops of the walls are adorned with cylindrical monuments; some of which are plain, covered with black cloth, crossed by a white fillet; while others are made of copper, burnished with gold: as the palace and mausoleums are thus adorned with profusion, the view of the monastery, on approaching it from the plain, is brilliant and splendid. The plain of Teshoo-Loomboo, which is perfectly level, is encompassed by rocky hills: its length is about fifteen miles, and its southern extremity, from E. to W., is five or six miles broad. The rock, upon the southern face of which the monastery is situated, nearly occupies the whole width of the valley, and approaches so near to the hills, as to form a narrow defile, leaving room only for a road, and the bed of the river Painom-tchieu, which runs through it, and at a small distance joins the Burhampooter. A fortress commands the pass. The rock of Teshoo-Loomboo is the loftiest of all that are in its vicinity; and the monastery near its base is thus guarded from the violence of the N.W. winds. From the summit of this rock the eye commands a very extensive prospect, and the most interesting object in view is the celebrated river Burhampooter, called in the language of Thibet Erechoomboo. Here it receives the tributary waters of the Painom-tchieu. Turner's Thibet.

TESI TRAMONTINI, VITTORIA, in *Biography*, one of the most renowned female singers that Italy has produced. She was born at Florence in 1690; began her vocal studies under the maestro di cappella Francesco Redi; then went to Bologna, and became a pupil of Campeggi; and received her last polish from Bernacchi. But she was no less admired

for the dignity, grace, and propriety of her action, than her vocal powers.

Quantz, who heard her at Dresden in 1719, in the famous opera that was performed on occasion of the nuptials of the prince royal of Poland, sing with Senesino, the Berfelli, wife of Lotti, Durestante, and the Faustina, characterizes her in the following masterly manner.

"Vittoria Tesi had by nature a masculine, strong, contralto voice. In 1719 she generally sung, at Dresden *all' ottava*, such airs as are made for base voices; but afterwards, besides the majestic and serious style, she had occasionally something coquettish in her manner, which was very pleasing. The compass of her voice was so extraordinary, that neither to sing high nor low gave her trouble. She was not remarkable for her performance of rapid and difficult passages; but she seemed born to captivate every spectator by her action, principally in male parts, which she performed in a most natural and intelligent manner." Life of Quantz, written by himself.

She sung at Naples in 1725, and at Vienna in 1748, where she remained till the time of her decease, in 1775, at 85 years of age.

She was the mistress of the Teuberinn and the De Amicis, both as justly famed for their acting as singing.

We were told at Vienna in 1772, that she had long quitted the stage, though the remembrance of her talents was so deeply impressed in the minds of many excellent judges, that whenever she was mentioned, it was to the disadvantage of all subsequent female singers. She had been very sprightly in her day, and yet was in high favour with the empress-queen in her latter years. Her story is somewhat singular. She was connected with a certain count, a man of great quality and distinction, whose fondness increased by possession to such a degree as to determine him to marry her: a much more uncommon resolution in a person of high birth on the continent, than in England. She tried to dissuade him: enumerated all the bad consequences of such an alliance; but he would listen to no reasoning, nor take any denial. Finding all remonstrances vain, she left him one morning, went into a neighbouring street, and addressing herself to a poor labouring man, a journeyman baker, said she would give him fifty ducats if he would marry her; not with a view to their cohabiting together, but to serve a present purpose. The poor man readily consented to become her nominal husband: accordingly they were formally married; and when the count renewed his solicitations, she told him it was now utterly impossible to grant his request, for she was already the wife of another; a sacrifice she had made to his fame and family.

Since that time she had lived many years with a man of great rank at Vienna, of nearly her own age; probably in a very chaste and innocent manner.

TESIA, in *Geography*, a town of New Mexico, in the province of Mayo; 45 miles E.S.E. of Santa Cruz.

TESIN, a town of Syria, celebrated for its olive oil; 18 miles N.E. of Antioch.

TESINO, a department of Italy, formed of the Pavese. It contains 156,471 inhabitants, who elect twelve deputies. Pavia is the capital.—Also, a river of Italy, which rises in mount St. Gothard, and passing through lake Maggiora, empties itself into the Po, at Pavia.

TESINO, or *Tessin*, a town of the county of Tyrol; 24 miles N.E. of Trent.

TESKELA, a town of Finland; 70 miles E. of Biorneborg.

TESKOWA, a town of Poland, in Volhynia; 40 miles E. of Lucko.

TESOKO, a small island in the Spanish Main, near the coast of South America. N. lat.  $10^{\circ} 8'$ . W. long.  $75^{\circ} 46'$ .

TESPIS, in *Ancient Geography*, a town of Asia, in the interior of Carmania, and near Carmana. Ptolemy.

TESS, in *Geography*, a river of Moravia, which runs into the Marsch, 8 miles N. of Muglitz.

TESSAILAH, a town of Algiers; 20 miles S. of Oran.

TESSALON. See THESALON.

TESSARACONTA, τεσσαρακοντα, among the Athenians, were forty men who went their circuits round the several boroughs, and had cognizance of all controversies about money, if not above ten drachms; as also of actions of assault and battery. Potter, *Archæol. Græc.*

TESSARACONTERIS, in the *Naval Architecture of the Ancients*, a word used to express a sort of galley, in which there were no less than forty tiers of rowers one above another. See ENNERIS and POLYCROTA.

TESSARA-COSTA, in our *Ancient Writers*. See QUADRAGESIMA.

TESSARACOSTON, τεσσαρακoston, in *Antiquity*, a solemnity kept by women on the fortieth day after child-birth, when they went to the temple, and paid some grateful acknowledgments for their safe delivery. Pott. *Archæol. Græc.* tom. i. p. 432. and tom. ii. p. 335.

TESSARINI, CARLO, in *Biography*, first violin, and leader of the band in the metropolitan church at Urbino, was born at Rimini in 1690; he was a spirited performer on his instrument, and a very voluminous composer. His style was light and limsy, compared with that of Corelli and Gemiani; but his concertos not being very difficult, were much played in country concerts in our own memory, with those of Alberti, Albinoni, and Vivaldi.

Tessarini's first publication at Amsterdam has a title-page of great promise; but whether the promise was ever performed, sceptics in these incredulous days will be much inclined to doubt. The title is in French, but literally translated, is the following: "A new Method for learning theoretically, in a Month's Time, to play on the Violin, divided into three Classes, with progressive Lessons for two Violins." Then twelve violin concertos; twelve flute solos; the master and scholars; divertimenti for two violins; twelve violin solos; six divertimenti for two violins, in canon, &c. &c. He lived till the year 1672, in the perpetual labour of publication; but his productions would now be as difficult to find as those of Timotheus and Olympus.

TESSE, in *Geography*, a town of France, in the department of the Sarthe; 15 miles S.W. of Le Mans.

TESSELÆ, a word used in *Pharmacy*, to express lozenges cut into regular figures.

TESSELARII, among the Romans, artificers of chequered or mosaic work.

TESSELATED PAVEMENT, *pavimentum tessellatum*, a rich pavement of mosaic work, made of curious small square marbles, bricks, or tiles, called *tessella*, from the form of dies.

Tesselated pavements were much used in the tents of the Roman generals.

TESSERA, in *Roman Antiquity*, denoted in its primary sense a cube or dye; so called from the Greek word τεσσαρα, or τεσσαρα, four; respect being had to its number of sides, distinct from the two horizontal planes, above and below. And it was thus distinguished from the *talus*, which, being round at each end, contained only four planes or faces on which it could stand; and therefore, when thrown, had no

more than two side faces in view. Hence *ludere talis et ludere tessera* are spoken of by Roman writers as two different games. The syllable *tes*, occurs often in Roman inscriptions.

The word *tessera* was applied to many other things, not so much from a similitude in the figure, as from the relation they bore to some other thing of which they were the sign or token; as the points on the upper plane of the dye denoted the good or ill success of the cast.

The *tessera hospitalis* was either public or private. As to the former, we find among the inscriptions published by Gruter, instances of two municipal towns which put themselves under the patronage of the Roman governor; and the reciprocal engagements between them, engraved on two copper-plates in the form of an oblong square, with a pediment at the top, is called in both *tessera hospitalis*.

The design of the latter was to cultivate or maintain a lasting friendship between private persons and their families; and gave a mutual claim to the contracting parties, and their descendants, of a reception and kind treatment at each other's houses, as occasion offered. For which end those tesserae were so contrived, as best to preserve the memory of that transaction to posterity. And one method of doing this was by dividing one of them lengthwise into two equal parts, upon each of which one of the parties wrote his name, and interchanged it with the other. From this custom came the prevailing expression *tesseram hospitalem infringere*, applied to persons who violated their engagements.

The *tessera frumentaria* were small tallies given by the emperors to the populace of Rome, entitling them to the reception of a quantity of corn from the public at stated seasons. The person who had the inspection of these was called *tesserarius*. They were made of wood and of stone.

There was another kind of tessera which intitled persons to a sight of the public games and other diversions, usually made in the form of an oblong square.

The *tessera militaris* was a signal given by the general, or chief commander of an army, as a direction to the soldiers for executing any duty or service required of them.

This, upon urgent occasions, was only vocal; but, in ordinary cases, it was written on a tablet, commonly made of wood. Beside the civil and military tesserae, there are others which related to religious affairs, and may be called sacred. Phil. Transf. vol. xlv. art. 12.

TESSERMUIT, in *Geography*, an island near the S.W. coast of East Greenland. N. lat.  $59^{\circ} 59'$ . W. long.  $44^{\circ} 20'$ .

TESSET, a town and district of Africa, in the country of Sahara; 170 miles S. of Morocco. N. lat.  $15^{\circ} 24'$ . W. long.  $7^{\circ}$ .

TESSIN, CHARLES GUSTAVUS, in *Biography*, a Swedish count and considerable statesman, was born at Stockholm in 1695, and received the rudiments of his education under his father. In 1714 he set out on his travels, and continued them through various countries of Europe for five years, availing himself of every opportunity that occurred of acquainting himself with their respective constitution and laws. At the age of twenty-five he was deputed to the courts of Great Britain, Denmark, and France, and also to the States of Holland, to announce the accession of Frederic I. to the Swedish throne; and in 1725 he was sent to Vienna, to solicit the attention of that court to the new treaty of alliance between Sweden and Russia. On the death of his father, in 1728, he succeeded him as principal intendant of the court, and in order to qualify himself for the office, he undertook a new tour at his own expence. In 1735 he was again dispatched

to the court of Vienna, where he remained two years. He was chosen by the nobility speaker at the famous diet of 1738, on which occasion he obtained, in recompence of his conduct, a gold medal, bearing on one side his crest, and on the other the motto "Conseius Recti." He was appointed in 1739 to conduct an embassy from this diet to France, and resided at Paris till the year 1742, concluding during this interval an advantageous treaty of commerce with the king of the Two Sicilies, and terminating a subsidiary treaty of alliance with France, by which Sweden was to receive in the course of three years 27 tons of gold. In 1743 he was sent to Denmark, and in the following year to Berlin, on business of great importance. At Berlin he was honoured with the Prussian order of the Black Eagle. He occupied several other stations of dignity and trust, the duties of which he discharged with singular wisdom and fidelity. But the most important office assigned him, was that of preceptor to the crown prince, Gustavus III., to which he was appointed in 1747. On this occasion he wrote his "Letters addressed to a Young Prince," for the use of his royal pupil, which were afterwards translated into most of the languages of Europe. Retiring from public business in 1761, he lived on his estate till the time of his death, which happened in January 1770. Count Tessin was a zealous patriot and enlightened citizen, and a distinguished patron of letters. With a view of encouraging the arts and sciences, he made a great collection of books, pictures, drawings, coins, and other curiosities. But notwithstanding his various excellent qualities, his enemies were assiduous in fruitless attempts to throw a shade over his character, as may be seen in a work entitled, "An Historical Account of the State of Sweden under Frederic I." Gen. Biog.

TESSIN, in *Geography*, a town of the duchy of Mecklenburg; 18 miles S.E. of Rostock.

TESSIURSAK, an island near the W. coast of West Greenland. N. lat. 61° 10'. W. long. 47° 30'.

TESSOUA, a considerable town of Africa, in the country of Fezzan; 100 miles E.S.E. of Mourzouk. Near this town, a river, now overwhelmed by the moving sands, but formerly a deep and rapid stream, had its course.

TESSOUELLE, a town of France, in the department of the Mayne and Loire; 5 miles S. of Chollet.

TESSUA, a town of Hindoostan, in Rohilcund; 18 miles S.S.E. of Bercilly.

TESSUE, a town of Persia, in the province of Adirbeitzan; 50 miles W. of Tauris.

TESSUNTEE, a town of the state of Georgia; 80 miles W. of Tugeloo.

TESSUT. See TEECUT.

TESSY, a town of France, in the department of the Channel; 9 miles S. of St. Lo.

TEST, in *Metallurgy*, is a vessel of the nature of a coppel, used for large quantities of metals at once, and formed of the same materials.

The coppels, or small vessels, serve for operations of this kind, when small quantities only are concerned; but when larger are worked on, vessels of a larger size and coarser texture are employed, which are distinguished by the name of *tests*.

These are usually a foot and half broad, and are made of wood-ashes, not prepared with so much care as for coppel-making, and mixed with finely powdered brick-dust; these are made into the proper shape, either by means of a shallow vessel, made of crucible earth, or cast-iron, of proper dimensions, or only an iron ring, or hoop, with three bars arched downwards across the bottom, about two inches deep, and of different widths, from three or four inches to fifteen or

more, according to the quantity of metal to be tested at once.

To make them in the first manner, an earthen vessel is to be procured, not glazed within, and by its depth and breadth proportioned to the quantity of metal to be worked; the inside of this vessel is to be well moistened with fair water, that the ashes to be put into it may adhere the better. Put into this vessel, thus prepared, the ashes and brick-dust before-mentioned, and first moistened either with water alone, or with water with a little white of an egg mixed in it; let the quantity of this be so much as will half fill the vessel, then press the mass with a wooden indented pebble, or, if not for a very large test, with a wooden cylinder, only of an inch thick: when thus pressed down add fresh ashes, and press them a second time, as in the making of coppels, and repeat this addition of fresh ashes till the earthen vessel be nearly full; then remove the superfluous ashes with an iron ruler, and let the inequalities remaining at the border be smoothed with a wooden or glass ball rolled round about. This done, you are to cut the cavity with a bowed iron, that you may have a broad spherical segment, not very deep; and lastly, by means of a sieve, strew this cavity carefully and regularly over with dry ashes of bones of animals, ground extremely fine, and squeeze these hard in, by the rotation of the wooden or glass ball. Thus you have a test finished, which, together with its earthen pot, must be set in a dry warm place.

To make the tests in the other manner, or by means of an iron ring; let a ring of that metal be filled with ashes mixed with brick-dust, and moistened as before mentioned, in such manner that they may rise considerably above the ring; then press them strongly either with your hands, or with an indented pebble, and afterwards, with gentle blows of a rammer, press the ashes from the circumference toward the centre, in a spiral line, and that in such manner, that, after having been sufficiently pressed, they may be a small matter higher than the brink of the ring. If there are now any vacancies in the mass, empty the ring, and fill it again with more ashes; for if you should attempt to fill up these by adding, were it but ever so little, ashes, the second, or additional quantities, will never cohere so firmly with the first, but that they may probably separate in the operation.

This done, turn the ring upside down, and on the other side, or bottom, take out the ashes to the quantity of one-third part of the depth of the ring, and again fill the cavity with the same ashes, in such a manner that there may remain no sensible cavity,

When the mass is thus prepared, cut out a cavity in the larger surface of the ring, with a bowed iron, as in the former method.

The Germans have, beside these, another kind of tests, which they call *treibscherben*. These are a sort of vessels which resist the most violent fire, and are so extremely compact, that they sometimes will retain not only melted metals, but even the glass of lead itself.

The figure and size of these vessels may be the same with that of the coppel, but they are usually made larger; and the great difference of these tests from coppels, and from the ordinary tests, which are indeed only a kind of large and coarse coppels, is, that the matter of these is more compact and coherent.

The matter for making these tests is thus prepared: take of the purest and finest clay a sufficient quantity, make it into balls, and dry them either in the air, or on the fire; when dried, beat them to powder in a mortar, and pour on the powder a great quantity of warm water; let this mixture rest a while, and when the clay has subsided, pour off the

the water which swims at top; and let this washing be so often repeated, that all the most minute lumps of the clay be broken, and whatever salt it contains perfectly washed out: then add to this fine clay, of the purest sand, of powder of calcined flints, ground, and well washed, of faulty but clean Hessian crucibles, or of any incombustible stones ground very fine, such a quantity as will render the mass thick, and hardly adhering to the hands in kneading it, or pliant when rolled into a thin lamina.

This is the matter for making this sort of tests; but, before any quantity of the vessels be made of this earth, it will be prudent first to finish a single one, and try it, by putting on it a quantity of glass of lead, and exposing it for an hour or more to the strongest fire; by this trial you will be certain whether or not the mass is capable of making vessels that will resist both the fire and the glass of lead; and by no other means but this trial is it possible to determine the due proportion of the mixture of the ingredients for this use, on account of the variety of the clays. Nature in some places affords a clay so well tempered, that it is extremely proper for the making of tests without any preparation, or without the admixture of any other matter. Sometimes this only requires a simple washing, but commonly it is necessary to make it into balls, and powder or wash them as before directed.

On the trial of a test made of this, or the former mixed clay, if it runs into glass, you must add to it of the powder of stones, especially such as best resists the fire. Great care is to be taken not to add too much powdered chalk to these compositions, since if the matter is tempered with that alone, the tests will indeed resist the fire very well, but being too porous, they will yield a passage to litharge, which will soften them to such a degree, that they will either fall asunder of themselves, or be totally crushed when taken hold of with the tongs.

These vessels are to be made in the following manner: rub over the sides and bottom of a small mortar, and also its pestle, with oil, or with the fat of bacon; fill it two-thirds full of prepared clay, then make a slight impression with your fingers in the middle of the clay; then place the bottom of the pestle there, and force it down with blows of a hammer, the stronger the better. When thus properly hollowed, take it out of the mortar, and pare its edges, and dry it, as the coppels are dried, in the air, in a dry warm place.

Tests thus prepared may be used as soon as dry, unless for salts or litharge; but these bodies, when melted in vessels not first baked or hardened in the fire, always make their way through them.

Some of the German writers also recommend, both for tests and coppels, a sort of friable opaque stone, called white spath, which appears to be a species of gypsum, or of the stones from which plaster of Paris is prepared. The spath is directed to be calcined with a gentle fire, in a covered vessel, till the slight crackling, which happens at first, has ceased, and the stone has fallen in part into powder; the whole is then reduced into subtle powder, which is passed through a fine sieve, and moistened with so much of a weak solution of green vitriol, as is sufficient for making it hold together. Gellert, however, finds, that if the stone is of the proper kind, which can be known only by trials, calcination is not necessary. These tests are liable to soften or fall asunder in the fire, which inconvenience may be remedied, according to Scheffer, by mixing with the uncalcined stones somewhat less than equal its weight, as eight-ninths of such as had been already used and penetrated by the scoria of the lead, taking that part of the old test which

appears of a green-grey colour, and rejecting the red crust on the top. But from his account it appears, that these tests are less durable than those made of the ashes of bones, though much superior to those of wood-ashes. Vegetable ashes, which stand pretty well the testing of silver, can scarcely bear any great quantity of gold, which requires a considerably stronger fire than the other; but bone-ashes, says Dr. Lewis, answer so effectually, and are among us so easily procured, that it is unnecessary for the refiner to search for any other materials. Cramer's Art of Assaying, p. 60. 62. Lewis's Com. Ph. Tech. p. 144.

*TEST-Liquor*, a term used by our dealers in brandies, &c. for a liquor which they use as a test of brandy, &c. to prove whether they be genuine, or mixed with home spirit. The people who use this, place great confidence in it, but it is really a very vague and uncertain thing. They pretend that this liquor will shew, by the colour which it makes on its being poured into brandy, whether it be genuine or adulterated; or if not genuine, in what proportion the adulterating spirit is mixed with it.

The whole fact is this: if a little common green or white vitriol be dissolved in some fair water, it makes a test-liquor, a few drops of which being let fall into a glass of old French brandy, will turn the whole to a purple or fine violet-colour; and by the strength or paleness of this colour, the dealers judge the brandy to be genuine or mixed in different proportions, with home spirits.

Old French brandy, having long lain in the cask, takes a dilute tincture of the wood of the cask, that is, of oak; and this being of the same nature with a solution or tincture of galls, naturally turns blueish or blackish with vitriol. A new distilled brandy, though wholly foreign, would not give this test; and a common malt spirit, with oak chips infused in it, will turn as dark as the finest brandy. While our distillers, indeed, had nothing in use for the colouring of their spirits but burnt sugar, it was possible to make some guess at an adulteration with them, because the brandy, in this case, would not become blackish in proportion to its former colour; the sugar colour not turning to ink with the vitriol, like the other: but our distillers have since found a way of using an extract of oak for the colouring of their spirits, and since that, this test-liquor is of very little use, our common spirits, of any kind, turning as deep with it as the foreign brandies.

The very best way of making this test-liquor, is with a calcined vitriol of iron, dissolved in a dilute or aqueous mineral acid. The liquor, when well made in this manner, is of a fine yellow colour, and will give, for a time, the finest blue to any spirituous tincture of oak.

The English were, at one time, very fond of high-coloured brandies, and it was then that the use of this test-liquor was most esteemed; afterwards we, as well as other nations, finding that this colour was only owing to the cask, began to dislike, and to favour the pale brandies: at length we fell into the use of such as were wholly limpid and colourless, and the re-distilling of all the old brandies of which people were possessed, took place; on this the test-liquor was found to be of no use at all, and accordingly rejected; but as we are of late again come into the esteem of coloured brandies, and that with great justice, as the colour, when genuine, is a certain mark of the age of the liquor, this test-liquor is again got into more credit than it deserves.

The famous Helvetian styptic depended wholly on this accident for its colour; and it was no small mortification to our chemists, when, some years ago, it was introduced into use among us, that they could not make it with our own spirits, but must be at the expence of true French brandy

## TEST-ACT.

brandy for it; our own spirits, though equally coloured, would never make that violet tincture, because their colour was owing to burnt fugar, not a tincture of oak. At length this mystery was explained, and a little scrapings of galls made all those quantities of this styptic, which had been set by as good for nothing, perfectly fine and well-coloured. Shaw's Essay on Distillery.

TEST-ACT, in *Law*, is the statute 25 Car. II. cap. 2. (1673) which directs all officers, civil and military, to take the oaths, and make the declaration against transubstantiation, in the court of king's bench or chancery, the next term, or at the next quarter sessions, or (by subsequent statutes) within six months after their admission; and also within the same time to receive the sacrament of the Lord's supper, according to the usage of the church of England, in some public church, immediately after divine service or sermon, and to deliver into court a certificate thereof, signed by the minister and churchwarden, and also to prove the same by two credible witnesses, upon forfeiture of 500*l.* and disability to hold the same office. Besides this penalty, if, without taking the sacramental qualification within the time prescribed by the act, a person continues to occupy a civil office, or to hold a military commission, and is lawfully convicted, then he is disabled from thenceforth, for ever, from bringing any action in course of law, from prosecuting any suit in any court of equity, from being guardian of any child, or executor or administrator of any person, as well as from receiving any legacy. For an account of the nature and operation of the CORPORATION ACT, we refer to that article.

The word *test* signifies *proof* or *trial*, being formed of *testis*, *witness*; this act being established with a view to exclude Roman Catholics from any share in the government, though it has operated to the exclusion of Protestant dissenters in general. The Corporation act, enacted in the year 1661, the 13th of Charles II., was principally, but not wholly, designed against Protestant Non-conformists. It was passed in a period of great heat and violence, the year after the Restoration; and it paved the way for the act of uniformity, which soon after passed. The king, with his ministers, and the majority in both houses, hated the Presbyterians, whom they considered, whether justly or not, as the authors of the late rebellion. Great power still remained in their hands, for, during the Protectorate, they had been appointed magistrates in all the country towns. To leave authority in such hands seemed dangerous: it was therefore judged expedient to regulate the corporations, and to expel those magistrates, whose principles were inimical to the constitution, civil and ecclesiastical. This gave rise to the Corporation act. The sacramental clause, however, in the Corporation act was intended against the Catholics; for, as the other provisions of the statute, by dispossessing the enemies of the court, had established the influence of the crown in all the corporations of the kingdom, the parliament was apprehensive that in the *next* reign, under a *Catholic* king, all corporation offices would be filled with *Catholics*. Besides, before the passing of the act of uniformity, those that were afterwards called dissenters, were within the inclosure of the church, and consequently participated in her sacraments, so that the sacramental clause must therefore have been intended as a guard against the Catholics, to whom it effectually applied, and not as a guard against those who were afterwards called dissenters, on whom, at that period, it could not operate.

It must also be allowed, that the original design of the test was not so much to exclude the Protestant dissenters, as the papists, as the Catholics were then called. It was brought in by the patriots, in the reign of Charles II.,

under their apprehension of popery, and a popish successor; and when, during the debate in the house of commons, it was observed, that it was drawn in such a manner as to comprehend the Protestant dissenters, the court greatly endeavoured to avail themselves of that circumstance in order to defeat the bill. But the dissenting members disappointed them, by declaring, that they had rather confide in the justice and generosity of parliament, to pass some future bill in their favour, than be the occasion of retarding or defeating the security, which the present bill was calculated to afford to the liberties of their country. Their patriotism produced, soon afterwards, a bill for their relief from the penal laws; but the parliament was prorogued, through the resentment of the court, to prevent its passing: and when, notwithstanding this, a bill in favour of the dissenters did afterwards pass both houses, *viz.* in the year 1680, and lay ready for the royal assent, the court ventured upon a very extraordinary expedient: the clerk of the crown was ordered to convey away the bill, and, accordingly, it was never afterwards to be found. The particular test of receiving the sacrament according to the rites of the church of England, was calculated to exclude the papists rather than the Protestant dissenters; as it was no uncommon thing for the latter, at that time, to receive the sacrament occasionally in the church of England, in order to express their charity towards it, as a part of the church of Christ. If it had been the design of the legislature to exclude all from civil offices but those who have a real affection for the constitution and worship of the church, it is apprehended they would have appointed the test to be, not merely once taking the sacrament at church, but a stated and constant conformity to its religious services.

It has been alleged, however, that though the Test act was designed against the Catholics, yet that few, even then, of the number, merited a treatment so severe. They, it is said by their advocates, had no concern in the views of Charles or his brother, in the schemes of wild ministers, or in the machinations of bad politicians. They had suffered much in the royal cause, and were pining in penury and distress, under the additional pressure of cruel laws. But whatever might be the reasons, real or pretended, for passing an act, of which Catholics were the principal ostensible objects, the case is now very much altered, and Catholics have assumed a new character, which entitles them, in the judgment of many, not merely to protection, but to a participation of the privileges of their fellow-subjects.

As the question concerning the repeal of the disqualifying laws which we have already mentioned, has been, and is likely soon again to become a subject of public discussion, and as it is a subject, generally considered, of great importance and interest, it may not be thought improper to state the arguments for and against the repeal of those excluding statutes, comprehending both Protestant dissenters and Catholics, in as concise a manner as possible. The general principles upon which the equitable decision of this question depends, are such as follow:—Every man has an undoubted right to judge for himself in matters of religion; nor should any mark of infamy, or any civil penalty, be attached to the exercise of this right:—Every man has a right to the common privileges of the society in which he lives; and among these common privileges, a capacity of law for serving his sovereign and country is one of the most valuable, distinguishing a *legal capacity* of service, from a *right* to an actual appointment, which depends upon the choice of his sovereign, or of his fellow citizens; and this capacity of serving the state is a right of such high estimation, and of such transcendent value, that exclusion from it

is deemed a proper punishment for some of the greatest crimes:—Actions, and not opinions, political or religious, are the proper objects of human authority and cognizance:—No man, who does not forfeit that *capacity* of serving his sovereign and country, which is his natural right, as well as the honour and emoluments that may happen to be connected with it, by overt-acts, ought to be deprived of them; and disabilities that are not thus incurred are unjust penalties, implying both disgrace and privation:—Punishment, without the previous proof of guilt, cannot be denied to be an injury; and injuries inflicted on account of religion are undoubtedly persecutions:—The ends of civil society can never justify any abridgment of natural rights that is not essential to these ends:—The institutions of religion, and the ordinances of civil government, are distinct in their origin and their objects, in the sanctions that enforce them, and the mode in which they are administered:—The institution of the Lord's supper, being wholly of a religious nature, and appointed merely as a memorial of his death, is improperly applied to the secular ends of civil society; and if it be so applied, it is not only an improper, but in many cases an insufficient, test of the principles and character of those to whom it is administered. Such are some of the leading principles, which have been the subjects of discussion in the debates that have occurred, both among writers and among our legislators, in considering the expediency of repealing the test laws. The case of the Catholics and of the Protestant dissenters has been repeatedly argued in both houses of parliament, and may probably again become the subject of public discussion. Many (indeed most) of the same arguments apply to both descriptions of persons; but we shall chiefly restrict ourselves to the pleas of the dissenters. They have urged, that being well-affected to his majesty and the established government, and ready to take the oaths required by law, and to give the fullest proof of their loyalty, they think their scruple to receive the sacrament after the manner of the church of England, or after the manner of any church, as a qualification for an office, ought not to render them incapable of holding public employments, civil or military: they also allege, that the occasional receiving of the Lord's supper as a qualification for a place, cannot, in the nature of things, imply that those who thus receive it, mean to declare their full and entire approbation of the whole constitution and frame of the established church; some men may be compelled by their necessities, or under the allurements of secular advantages, to do what they would not do, if they were left to their free choice. Others, perhaps, may comply with the sacramental test who are not even Christians, and who therefore cannot be supposed to wish well to Christianity itself, or to any national establishment of it whatsoever. Hence they are led to think, that such a test can be no real or effectual security to the church of England. Conceiving that they have a right, as *men*, to think for themselves in matters of religion, and that this right is prescribed and sanctioned by the Author of Christianity; and that they have a right, as *citizens*, to a common chance with their fellow-subjects for offices of civil and military trust, if their sovereign or fellow-citizens should think them worthy of confidence; they cannot be of opinion that any of the ends or objects of civil society require that these rights should be superseded, and that they should be excluded from the service of the state. Their advocates plead on their behalf, that the continuance of those acts which invade their rights is so far from being necessary to the well-being of the state, or to the establishment of the national church, that they are actually pernicious both to the state and church, and ought to be repealed. Their in-

utility is shewn by referring to the higher trust of legislative authority, to which the dissenters are admitted without hesitation or reserve, and without submitting to any such test. An exciseman surely, it is said, does not sustain a more important office, neither is it necessary that he should make a profession of his Christian faith more than a member of the house of commons or the house of peers. The principles of the dissenters, their attachment to the constitution, and their zeal in support of it, have been sufficiently manifested in a variety of instances, from the Revolution to the present day; and yet can it be asserted, that their exclusion from the service of the public is necessary or beneficial to the state? Can it be said that the continuance of the disabilities to which their profession subjects them, is necessary for the safety or honour of the church? The establishment of a church requires a legal provision for its ministers; but it does not require for its laity an exclusive right to civil and military trusts. The establishment of the church of England consists in her tithes, her prebendaries, her canonries, her archdeacons, her deaneries, and her bishoprics. These constituted her establishment before the Corporation and Test acts had any existence: and they will equally constitute her establishment if these acts should be repealed. In Scotland they have had no such acts; and yet Scotland has an established church. In Ireland these acts have been repealed; and yet the established church of Ireland remains. In Holland, Russia, Prussia, Germany, &c. they have no such acts. As to the intimate and beneficial connection between church and state, on which some have grounded the supposed propriety and necessity of these laws, it would be sufficient to refer to the authority of archdeacon Paley, who has stated what ought to be the single end of church establishments. (See RELIGION.) Upon an appeal to history, it has been argued that the civil government maintained itself in former times, when *unconnected* with the church; and the disturbances which terminated in the ruin of both church and state, are said to have originated in the intolerant spirit and arbitrary proceedings of some ecclesiastics, who had themselves exercised powers, and had instigated their unhappy sovereign to actions and claims at least as contrary to, and subversive of, the true spirit of the constitution, as any of those violences of the times immediately succeeding, which have been so justly reprobated. In this connection, we may refer to the speech of an able advocate for the repeal of the disabling statutes: who maintains that no human government has a right to inquire into men's private opinions, to presume that it knows them, or to act on that presumption. Men should be tried by their actions, not by their opinions. This, if true with respect to *political*, was more peculiarly so with regard to *religious* opinions. In the position, said Mr. Fox, that the actions of men, and not their opinions, were the proper objects of legislation, he was supported by the general tenor of the laws of the land. History, however, afforded one glaring exception in the case of the Roman Catholics. The Roman Catholics, or rather the Papists, as they were then properly denominated, had been supposed by our ancestors to entertain opinions that might lead to mischief in the state. But it was not their religious opinions that were feared. Their acknowledging a foreign authority paramount to that of the legislature; their acknowledging a title to the crown superior to that conferred by the voice of the people; their political opinions, which they were supposed to attach to their religious creed, were dreaded, and justly dreaded, as inimical to the constitution. Laws therefore were enacted to guard against the pernicious tendency of their political, not of their religious, opinions; and the principle thus adopted, if not founded on justice,

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was at least followed up with consistency. Their influence in the state was feared, and they were not only restricted from holding offices of power or trust, but rendered incapable of purchasing lands, or acquiring influence of any kind. But if the Roman Catholics of those times were Papists in the strictest sense of the word, and not the Roman Catholics of the present day, still he would say, that the legislature ought not to have acted against them, till they put in practice some of the dangerous doctrines which they were thought to entertain. Disability and punishment ought to have followed, not to have anticipated, offence. Those who attempted to justify the disabilities imposed on the dissenters, must contend, if they argued fairly on their own ground, not that their religious opinions were inimical to the established church, but that their political opinions were inimical to the constitution. If they failed to prove this, to deprive the dissenters of any civil or political advantage, was a manifest injustice; for it was not sufficient to say to any set of men, we apprehend certain dangers from your opinions, we have wisely provided a remedy against them, and you, who feel yourselves aggrieved, calumniated, and proscribed, by this remedy, must prove that our apprehensions are ill-founded. The *onus probandi* lay on the other side; for whoever demanded that any other person should be laid under a restriction, it was incumbent on him first to prove that the restriction was necessary to his safety, by some overt act, and that the danger he apprehended was not imaginary but real. Was it seriously to be contended, that religion depends upon political opinions; that it can subsist only under this or that form of government? It was an irreverend and impious opinion to maintain, that the church must depend for support, on its being an engine, or ally, of the state, and not on the evidence of its doctrines, to be found by searching the scriptures, and the moral effects it produced on the minds of those whom it was its duty to instruct. See TOLERATION.

Mr. Pitt agreed with Mr. Fox in admitting, as a general principle, that the religious opinions of any set of men were not to be restrained or limited, unless they should be found likely to prove the source of inconvenience to the state: nor ought the civil magistrate, in any other point of view, to interfere with them; but he maintained, that when religious opinions are such as *may* produce a civil inconvenience, the government has a right to guard against the probability of the civil inconvenience being produced; nor ought they to wait till, by being carried into action, the inconvenience has actually arisen. It was not therefore on the ground that the dissenters *would* do any thing to affect the civil government of the country, that they had been excluded from civil offices, but that if they had any additional degree of power in their hands, they *might*. On the other hand it has been pleaded, that to restrain men's civil rights from the supposed *tendency* of their opinions, is a very dangerous principle, as it must render their condition precarious and wholly dependent on the prejudices and will of the magistrate, and warranted unlimited restraint, and almost every species of persecution.

Mr. Pitt, premising that the establishment of a settled form of church and of its ministers is necessary to the civil government of the country, suggests the impropriety of distributing the emoluments and offices of the established church among persons who, however respectable their characters might be, were not members of the same communion; but others say, that the emoluments and offices of the established church are not the objects contended for, but those of the state, unless the church and state be absolutely identified. He also says, that these offices may be considered as matter of favour, because it is consistent with the government of this country, that all offices should be given at

its discretion; and here, he says, from the delicate nature of the case, the legislature had thought proper to interpose, and to restrain the supreme magistrate, the head of the executive authority, and limit him in his appointment to these offices; but surely, as he contends, this differed essentially from any degradation, disgrace, or punishment of the dissenters. Others, however, have considered this kind of reasoning as fallacious, both in its principle, and in the inference deduced from it.

Mr. Fox concurred with lord North, who, though an advocate for the continuance of these disqualifying laws, bore testimony to the principles and character of the dissenters, in his avowal of their steady attachment to government; and he added, that their religious opinions were favourable to civil liberty, and that the true principles of the constitution had been remembered and affirmed by them, at times when they were forgotten, perhaps betrayed, by the church. See DISSENTERS.

Mr. Fox maintained, that the Test act was altogether inadequate to the end it had in view. The purport of it was, to protect the established church, by excluding from office every man who did not profess himself well affected to that church. But a professed enemy to the hierarchy might go to the communion table, and afterwards say, that in complying with a form, enjoined by law, he had not changed his opinion, nor, as he conceived, incurred any religious obligation whatever. There were many men, not of the established church, to whose services their country had a claim. Ought any such man to be examined, before he came into office, touching his private opinions? Was it not sufficient that he did his duty as a good citizen? Might he not say, without incurring any disability, "I am not a friend to the church of England, but I am a friend to the constitution, and on religious subjects must be permitted to think and act as I please." Ought their country to be deprived of the benefit she might derive from the talents of such men, and his majesty prevented from dispensing the favours of the crown, except to one description of his subjects? But whom did the test exclude, the irreligious man, the man of profligate principles, or the man of no principle at all? Quite the contrary; to such men the road to power was open; the test excluded *only* the man of tender conscience; the man who thought religion so distinct from all temporal affairs, that he held it improper to profess any religious opinion whatever, for the sake of a civil office. Was a tender conscience inconsistent with the character of an honest man? or did a high sense of religion shew that he was unfit to be trusted? Allowing that the established church ought to be protected, it was natural to inquire what was the established church? Was the church of England the established church of Great Britain? Certainly not: it was only the established church of a part of it; for, in Scotland, the kirk was as much established by law as the church was in England. The religion of the kirk was wisely secured, as the established religion of Scotland, by the articles of Union; and it was surely absurd to say, that a member of the kirk of Scotland, accepting an office under government, not for the service of England exclusively, but for the service of the united kingdom, should be obliged to conform, not to the religious establishment of Scotland, in which he had been bred, but to the religious establishment of England.

To the argument urged in favour of the Corporation and Test acts, founded on the apprehension that if they were repealed, the dissenters might become a majority of the people, Mr. Fox gives a brief reply, *viz.* that if the majority of the people of England should ever be for the abolition of the established church, then it ought to be abolished. It has been said, that by manifesting indulgence to other sects,  
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a candid respect for their opinions, and a desire to promote mutual charity and good-will, the established church will be most likely to secure its stability and its honour. Whilst the grievances of persons of a different profession are redressed, and they are admitted to a participation of their civil rights, the church need not fear any combination for sapping its foundation, or for depriving it of its peculiar and distinguishing honours or emoluments. Men who are aggrieved, under a sense of what they conceive to be an indignity and injury, are the most likely to manifest hostility against an ecclesiastical establishment that engrosses all civil and secular advantages to itself.

It has been said, that it would conduce to the honour of the rulers and dignitaries of the church, if they would concur in abolishing laws which perpetuate the perversion and profanation of a religious institution:—an institution which certainly was not intended by its divine founder for the attainment and promotion of any selfish and secular purposes. *Here*, it is maintained, if any where, a line of separation should be drawn between religious and civil policy; nor should the performance of a Christian duty be made an indispensable qualification for a secular office. The dissenters, says a well-informed member of the legislature (Mr. W. Smith), who, being himself one of them, is thoroughly acquainted with their principles and character, would equally object to receiving the sacrament *as a test* in their own places of worship, though many of them would not scruple to partake of it with their brethren of the establishment, and according to their form, when considered only in its true light, as a religious duty, and an expression of Christian charity. The writer of this article is acquainted with several conscientious and avowed members of the established church, who lament this abuse of a Christian ordinance, and who wish, for the purity and honour of the church to which they are attached, that the laws imposing this test were repealed. It would likewise contribute to the satisfaction of scrupulous ministers of the established church, to be released from the obligation of administering the sacrament, as a qualification for office abstractedly considered, and more especially to persons of known licentiousness of principles and conduct. By the duties of his function, by the positive precepts of his religion, and by the rubric or canons of the church, the minister is enjoined to warn from the sacred table all blasphemers of God, all slanderers of his word, all adulterers, and all persons of a profligate life; and yet to these very persons, if they demand it as a qualification, he is compelled, by the Test act, to administer the sacrament; and if he refuses, a ruinous prosecution for damages is the obvious and inevitable consequence. On the other hand it has been said, that if the minister's conviction of profligacy of conduct is supported by all the circumstances which constitute legal proof, he may lawfully refuse the sacrament. The truth of this opinion is doubtful; but it is certain, that if he should fail in that proof, his ruin is inevitable: and if he should succeed, it is almost equally certain; for the expences of his suit will devour his scanty means, and probably consign him to a prison for his life. Allowing that any notorious evil-doer, offering himself to receive the sacrament, might be rejected by the minister, without becoming liable to any punishment, let it be considered what is the situation in which A or B, or the person who upon application to a minister had been refused the sacrament, was placed: from that moment he had incurred the penalties of the act, and was punished in a manner perfectly new, unexampled, and unauthorized by the laws of the land; he was convicted without a trial by jury, and was disabled from enjoying an office which his majesty, in the legal exercise of his prerogative, had thought proper to confer on him; and a person was thereby absolutely put into

the hands of the clergy, who were to be the great arbitrators of qualification or disqualification for offices, and places of power and emolument. Some have attempted to justify the legal establishment of the profanation of a religious institution, by comparing it with those provisions of our law which enjoin the sanction of an oath; but this argument has been considered as inapplicable to the present case, and altogether unavailing; for though it be indeed true that the legislature, by compelling every petty officer of the revenue, and every collector of a turnpike toll, to swear deeply on his admission into office, has made the crime of perjury more common, at this time, in England, than it ever appears to have been in any other age or country; yet how does the frequent commission of this crime *against* law, justify the establishment of a religious profanation *by* law? But, without any comment on the folly of pleading for a legislative debasement of religion in one way, by shewing that the legislature has contributed to its debasement in another, let it be asked, what resemblance the sacrament of the Lord's supper, which is merely a religious institution, bears to the ceremony of an oath, which is an institution so entirely political, that it answers none of the purposes of religion, promotes none of her interests, forms no part of her establishment, and belongs as much to the Jew, the Mahometan, and the idolater, as it does to the Christian. The difference, says Mr. W. Smith, between the sacrament, used as a test for office, and an oath, as a test of truth, is too obvious to escape the most careless observer. An oath was neither primarily, nor at all, an act of worship; nor, though it necessarily supposed a belief in a supreme moral governor, was it ever used as a test of particular religious opinions: the sole object to which it was directed was the attainment of truth, (with respect either to the past or the future,) where other means were insufficient,—an appeal to a Being who, by the supposition, must be acquainted with all the circumstances, and must also be both able and inclined to punish falsehood in such cases, as an insult added to a crime, was perfectly well calculated to attain the proposed end, and inapplicable to any other purpose.

If, says Mr. Fox, in concurrence with some previous observations of Mr. Beaufoy, when a man is seen going to take the sacrament, it should be asked, “is this man going to make his peace with God, and to repent him of his sins?” the answer should be, “No; he is only going there, because he has lately received the appointment of first lord of the treasury;” can any circumstance afford a greater proof of the indecency resulting from the practice of so qualifying?

Some have contended, that to grant a remission in favour of Scotland of the Test and Corporation acts, would be a breach of the union; an opinion which supposes, that because, by the articles of union, nothing can be *taken* from Scotland but what was then stipulated, therefore nothing can be *given*. Others say, that as the Test and Corporation acts are among the statutes which secure the doctrines, discipline, worship, and government of the established church of England, they are therefore by the act of union declared to be unalterable. In reply to this mode of arguing it has been observed, that the government and discipline, the doctrines and the worship of the English church, were the same before the statutes were enacted, and would continue the same if those statutes were repealed; and consequently do not derive their security from them: whereas the act which relates to the patronage of the church of Scotland, and which *did* seem to affect its discipline, was held to be no breach of the articles of union; neither was that union understood to be weakened by the subsequent act, which gave a complete toleration in Scotland to episcopal dissenters.

When the articles of union were under the consideration of parliament, a proposal was made in the house of lords, that

that the perpetual continuance of the Test act; and in the house of commons, that the perpetual continuance of the Corporation act, should be declared a fundamental condition of the intended union: but the motions were both rejected; a proof that the legislature did not mean to give to them the same perpetual existence as to the act of uniformity, and to the statute that was passed in the thirteenth of Elizabeth, both of which were specifically named, as conditions of the compact, and expressly declared irrevocable.

If the test and corporation laws are deemed unalterable parts of the articles of union, it follows, of course, that every alteration in those laws must be deemed a breach of the union, and that every suspension of those laws must be considered as a suspension of the union. Now both these acts are altered, and in part repealed, by subsequent statutes, and for six months in almost every year are wholly suspended. But who will assert that the articles of union are dissolved, or that their obligation on the two countries is suspended for six months in every year? or who will deny that the same power which alters a part may alter the whole of those laws? Who will deny that the same authority which suspends a law for six months, may abolish it for ever?

In favour of the continuance of these laws it has been urged, that they have existed for many years with great advantage; but many attempts have been made to disprove the advantage of them, and they have repeatedly been complained of as both useless and unjust. Besides, this argument for their existence is absurd, as it tends to perpetuate every enormity that can plead the sanction of age. The horror of innovation may be felt or feigned as a bar to every improvement. It may be nevertheless asked, how have these laws subsisted? By repeated suspensions; for the indemnity bills are, with few exceptions, annual acts: and where would be the impropriety of suspending them for ever, by an act of perpetual operation. In order to silence complaints of these partial and injurious laws, it has been said that the act of indemnity, annually passed, protects from the penalties of the test and corporation laws all such persons as have offended against them. If it afford such protection, what inconvenience can arise from a repeal of the statutes themselves? Is not the constant and invariable practice of passing such a bill annually, a tacit acknowledgment that the test acts are improper or unnecessary; that the penalties, if incurred, ought not to be enforced; and therefore no man could be blamed for resorting to an indemnity, held out as a protection against punishments inflicted by laws which the legislature itself continually treated with a kind of disrespect, and which were already almost repealed in practice, though they were still preserved in the statute-book by a species of superstitious regard? The only justification for evading a statute, that can be for a moment maintained, is, when that statute notoriously ought not to remain in force; and when to evade it, on account of its nature and tendency, is meritorious. But it has been said, that the Indemnity act does not protect the dissenters from the test and corporation laws; for its only effect is, that of allowing farther time to those trespassers on the law, against whom final judgment has not been awarded. Should, for example, a prosecution have been commenced, but not concluded, the Indemnity act does not discharge the proceedings; it merely suspends them for six months; so that if the party accused does not take the sacrament before the six months allowed by the Indemnity act shall expire, the proceedings will go on, and, long before the next indemnity act will come to his relief, final judgment will be awarded against him. Thus it appears, that the Indemnity act gives no effectual protection to the dissenter, who accepts a civil office or military command;

for he who cannot take the sacrament at all, cannot take it within the time required by that act. After all, indemnity supposes criminality, and an obnoxiousness to punishment: the office and penalty are created by these statutes: repeal the laws, and indemnity becomes needless. No man would wish, if it were always practicable, to shelter himself under an act of indemnity for omitting to do what, independently of these laws, he ought not to do; or chuse to have it thought that he is less fit and able to serve his king and country than his neighbour, who does not feel the restraint of his conscientious scruples. In corporate towns and many public offices, the obligation to qualify is considered as a kind of dead letter, and an informer would be very generally thought an odious character.

As to the Corporation act, it is said to have been forced from the legislature as an act of self-defence; and this is the proper description of an act, which, after the lapse of much more than a century, when the grounds and reasons for passing it no longer existed, ought to be repealed. The question that forms the subject of this article is, in our opinion, intimately connected with the honour of the church and the prosperity of the state, as well as with the general interests of religion and liberty; and with these views of its importance, we refer the decision of it to the impartial judgment of the reader.

TEST, or *Tese*, in *Geography*, a river of England, which rises in the north-west part of Hampshire, bordering on Wiltshire, and runs into Southampton Water. Sir Henry Englefield seems inclined to think the original name was *Ant*.

TESTA, in *Antiquity*, the same with *ostracon*. See OSTRACISM.

TESTA, in *Italian Singing*. When a performer sings through the nose, the throat, or the teeth, the voice is called *voce da testa*, to distinguish it from *voce di petto*. Tosi says: "let the master attend with great care to the voice of his scholar, which, whether it be *di petto*, or *di testa*, should always come forth neat and clear, without passing through the nose, or being choaked in the throat; which are two of the most horrible defects in a singer, and past all remedy if once grown into a habit." Galliard's Transl. of Tosi on florid Song.

TESTA, PIETRO, in *Biography*, called Il Lucchese, from having been born at Lucca. His birth took place in 1611, and he was first instructed in painting by Pietro Paolini; afterwards he studied at Rome, under Domenichino and Pietro da Cortona. The principal objects of his study were antique marbles, and the remains of ancient architecture; in which employment such was his assiduity, that few vestiges of antiquity were known which had escaped his pencil. His extreme poverty made him morose and melancholy; and he made himself many enemies, by the freedom with which he spoke of the productions of other painters. From this state of trouble he was relieved by Sandrart, who found him among the ruins, and compassionating his distress, took him to his house, where he clothed and entertained him, and introduced him to the prince Justiniani, who employed him. After this he succeeded; and the great freedom and ease of his pencil procured him many patrons. Several of the churches and palaces at Rome are adorned with his productions: the best are esteemed to be those of the Death of St. Angelo, in the church of St. Martino à Monti, and of the Death of Iphigenia, in the Palazzo Spada. His works, however, are more frequently to be met with at Lucca. As a designer, Pietro Testa was unequal: he frequently tacked to antique torsos ignoble heads, and extremities copied from vulgar models. Of female beauty he appears to have been ignorant,

rant, though he adopted a character and form which are peculiar to himself. Of his compositions, generally perplexed and crowded, the best known and most correct is that of Achilles dragging Hector from the walls of Troy to the Grecian fleet. He delighted in allegoric subjects, and produced many of picturesque effect and attitudes: but, in their meaning, as obscure as the occasions to which they allude. Of expression, he only knew the extremes, grimace, or loathsomeness and horror. As a colourist, he was frequently rich and effective, harmonious and warm: and his execution bears the stamp of incredible freedom: while his chiaro-scuro is managed with great breadth and depth. His just character is that of a powerful machinist. He was drowned in the Tyber, in 1650, endeavouring to recover his hat, which the wind had blown into the water; though some suspect that he threw himself in, in a fit of despondency, to which he was prone.

He was an eminent engraver as well as a painter, and the number of his works in both arts attest his industry and ingenuity, considering the short period of his life.

TESTA, in *Botany* and *Vegetable Physiology*, is the skin of a seed or kernel, which enfolds the embryo, cotyledons, and, if present, the albumen, giving them their due shape; for this integument is perfectly formed, before they have attained any solidity or distinct organization. The skin is generally double, as may be seen in the peach, apricot, and walnut, that glutinous coat of the latter, which stains our fingers in peeling the kernel, being lined with a much finer, white and smooth membrane, technically called *membrana* by Gærtner. In true pulpy seeds, like those of *Jasminum*, a quantity of pulp is lodged between the *membrana* and the outer skin. Both these integuments burst irregularly, merely from the swelling of their contents in germination.

TESTA di Moro, in *Geography*, a small island near the E. coast of Sardinia. N. lat.  $40^{\circ} 45'$ . E. long.  $9^{\circ} 53'$ .

TESTA di Saori, a town of the island of Corsica; 7 miles N. of Bastia.

TESTA Nevilli, or *Testa de Nevil*, an ancient record kept by the king's remembrancer in the exchequer, containing the king's fees throughout the greatest part of England, with inquisitions of land escheated, and serjeanties.

It was denominatd from its compiler Johan. de Nevil, one of the itinerant justices under king Henry III.

TESTA Sepia. See CUTTLE-Fish Bone.

TESTACEOLOGY, the science of testaceous vermes, or, in other words, of those soft and simple worms, which have a shelly or testaceous covering; whether, as in some kinds, it be sufficient to envelope and conceal the whole body, or only to cover a portion of it, as in others. The term is derived from *testa*, a shell; or we should rather wish, in order to support our definition, from *Testacea*, the name of the order of those vermes which have a shelly covering, and which, in the Gmelinian system, are thus defined: TESTACEA. Animalia Mollusca simplicia, domo sepius calcarea propria, obteeta.

Under this idea of its derivation, the word testaceology must be considered preferable to that of conchology, in designating the science of those bodies which have a shelly covering; because it may imply, or be understood to imply, not only the science of the shells which form the covering or habitation, but the animal also by which it is inhabited, while that of conchology might be confined to the shells alone. It must however be confessed, that, strictly speaking, the terms testaceology and conchology are synonymous, and that their application in the manner we propose, must rather be determined by the taste of the future naturalist than any positive rule we might lay down. The

science itself is but a branch of vermeology; and either the term conchology or testaceology may be applied with much propriety, at the discretion of the writer.

The term testaceology is certainly of late invention, and may in some degree be regarded rather as an innovation than amendment; for even with the definition we might be inclined to assign it, in order that it may be retained, there is still no actual difference in its meaning from the term conchology, a term which, to use the words of a writer of the last century, "comprehends the study of all animals that are testaceous, or have shelly coverings; not only those of the sea, but also those of the rivers and land;" and it has moreover an evident claim to priority, having been in use for at least the last forty years among the best English authors. Da Costa, a writer of no ordinary information, indeed appears to have assumed to himself the establishment, if not the actual invention of the term; for in his "Elements of Conchology," published in 1776, he expressly observes, "this peculiar branch of the history of nature, I shall call conchology." Many authors call it conchyliology; and this we find to be true in compliance both with the French and the Latin, the "Conchyliologie" of D'Argenville, and "Historia Conchyliorum" of Lister, two works of great celebrity, that had appeared some time before his "Elements" were published. We have thus endeavoured to prove that the terms testaceology and conchology are purely synonymous; and if any doubt remained, we might finally quote one further passage from the Elements before alluded to, in which we are distinctly told, that "the term of Conchology, applied to this branch of natural history by all authors, is quite applicable to its arrangement by the shells, and not by the fish." As we have already endeavoured to exemplify the rise, progress, and present state of the science of testaceous bodies in a very ample manner under the article CONCHOLOGY, and may be allowed to presume, with some little confidence, that we have therein concentrated much useful information upon this truly pleasing and very favourite science, it might be esteemed a waste of words to enter into any very considerable digression upon the same subject again; we shall therefore merely recommend a careful perusal of that article to the attention of the reader, and trust the result will be considered satisfactory.

It was indeed our wish, and we had made some general promise to that effect, that under the present article we would resume this subject, and submit the outlines of what we were induced to think an improvement upon the present prevailing arrangement; and upon this point it is now incumbent to offer a few remarks.

The most ardent admirer of the great Linnæus will readily concede to us, that the science of conchology was not one of those within the province of his deep research, or the decided contemplation of his active mind. Its introduction as a science, was necessary to complete the series of the vast chain of animated nature, the classification of which he had undertaken in his "Systema Naturæ," and it was therefore one he could not omit. But for this, it is believed, and with tolerable certainty, that he would have willingly avoided the subject altogether in the latter editions of that work, as it was in the early ones. We have already shewn, under our article CONCHOLOGY, the actual state in which Linnæus found the science, as handed down to him by his predecessors; and the various purposes to which he applied their labours and assistance. From a general view of the whole, there can no doubt remain that there is yet much to amend in the classification of shells, and that the subdivision of many of the genera already established into natural genera, appears desirable. It was under this persuasion that we had

had intended, when writing the article TESTACEOLOGY, to have submitted our ideas as to a new and more comprehensive classification of the genera; to have pointed out the very essential distinctions that exist in shells of the same Linnæan genera; and have thence endeavoured to deduce an arrangement congenial with the characters of the respective natural genera which his artificial genera present. This we believe would have been regarded as an improvement in the classical distribution of the shell-tribe, but such an illustration does not appear, upon more mature reflection, to be admissible here. It must be apparent that no words, unaccompanied by figures, could possibly convey to the reader any adequate conception of the minute, ambiguous, and intricate essential characters, which many among the various tribes of shells present; and that such a series of plates as it would demand to illustrate a subject so very copious and diffuse, however desirable in the opinion of the naturalist, could not be appropriated, with any degree of propriety, in addition to the very costly series of plates already devoted by the Cyclopædia to this science in particular.

The series of plates which have already appeared, elucidate the whole of the Linnæan genera, and under each of those genera, a number of the more striking natural genera which appertain to them respectively. These plates are numerous, and the subjects for them have been selected with every possible attention; nor can we hesitate to think upon the whole they will be considered, without any further addition, as amply sufficient for every useful purpose of general information.

TESTACEOUS, in *Natural History*, an epithet given to those fish, which are covered with a strong, thick shell; as oysters, pearl-fish, &c.

In strictness, however, testaceous is only applied to fish whose strong and thick shells are entire; those which are soft, thin, and consist of several pieces jointed, as the lobster, &c. being called *crustaceous*.

In medicine, all preparations of shells, and substances of the like kind, are called testaceous.—Such are powders of crab's claws and eyes, pearl, &c.

Dr. Quincy, and others, suppose the virtue of all testaceous medicines to be alike; that they seldom or never enter the lacteals, but that the chief of their action is in the first passages; in which however they are of great use in absorbing acidities.

Hence they become of use in fevers, and especially in rectifying the many distempers in children, which generally owe their origin to such acidities.

TESTAMENT, TESTAMENTUM, in *Law*, a solemn and authentic act, by which a person declares his will, as to the disposal of his estate, effects, burial, &c.

Testaments, according to Justinian, and Sir Edward Coke, are so called, because they are *testatio mentis*; an etymon, says Judge Blackstone, which seems to favour too much of the conceit, it being plainly a substantive derived from the verb *testari*. The definition of the old Roman lawyers is much better than their etymology; *voluntatis nostræ iusta sententia de eo, quod quis post mortem suam fieri velit*; i. e. the legal declaration of a man's intentions, which he wills to be performed after his death. It is called *sententia*, to denote the circumspection and prudence with which it is supposed to be made; it is *voluntatis nostræ sententia*, because its efficacy depends on its declaring the testator's intention, whence in England it is emphatically styled his *will*: it is *iusta sententia*, that is, drawn, attested, and published with all due solemnities and forms of law: it is *de eo, quod quis post mortem suam fieri velit*, because a testament is of no force till after the death of the testator. Blackstone's Com. vol. ii.

A testament has no effect till after death, and is always revocable till then. As testaments are acts, of all others, the most subject to deceits, surprize, &c. it was found necessary to use all kinds of precautions to prevent the wills of the deceased from being eluded, and the weakness of dying persons from being abused. See WILL.

The most ancient testaments among the Romans were made *viva voce*, the testator declaring his will in the presence of seven witnesses; these they called *nuncupative* testaments; but the danger of trusting the will of the dead to the memory of the living soon abolished these: and all testaments were ordered to be in writing.

The French legislators thought *holographic* testaments, i. e. testaments written wholly with the testator's hand, an abundant security; but the Roman law, more severe, did not admit of testaments without farther solemnity.

The easiest, and most favourable, is the twenty-first law in the *code de testamentis*, which permits such as are unwilling to trust the secret of their testaments to others, to write it with their own hand, and to close it in the presence of seven witnesses, declaring to them, that it is their testament; after which it is to be signed by all the seven witnesses.

Otherwise, to make a solemn testament, it was required to be attested by seven witnesses, and sealed with their seals.

Yet the *military* testament was not subject to so many formalities: the soldier was supposed too much employed in defending the laws, to be subject to the trouble of knowing them. His tumultuary profession excused him from observing all the rules. See MILITARY.

Testaments, wherein fathers disposed of their estates among their children, had particular privileges, and were dispensed from most of the ordinary formalities.

TESTAMENT, *Probate of a*. See PROBATE and WILL.

TESTAMENT, *Old and New*, in *Sacred History*. The most common and general division of the canonical books of scripture, is that of the Old and New Testament. (See CANON.) The Hebrew word *Berith*, from which it is translated, properly signifies "Covenant." Accordingly St. Paul (2 Cor. iii. 6—18.), when he is shewing the superior excellence of the gospel covenant, or the dispensation by Christ above the legal covenant, or the dispensation by Moses, uses the word testament, not only for the covenant itself, but likewise for the books in which it is contained. The Hebrew term ברית, *berith*, invariably rendered covenant by our translators in the Old Testament, is uniformly translated Διαθηκη in the Septuagint; and in the writings of the apostles and evangelists, the words ἡ καινη διαθηκη are almost always rendered by our translators the New Testament. It is observed, that the Hebrew term corresponds much better to the English word "Covenant," though not in every case perfectly equivalent, than to "Testament;" and yet the word Διαθηκη, in classical use, is more frequently rendered *Testament*. Our translators, ancient and modern, have probably been led to render it Testament, by the manner in which the author of the epistle to the Hebrews argues (ch. ix. 16, 17.), in allusion to the classical acceptance of the term. The term *New* is added to distinguish the religious institution of Jesus Christ from the *Old Covenant*, that is, the dispensation of Moses. Accordingly the two covenants are always in scripture the two dispensations, or religious institutions; that under Moses is the *Old*, and that under the Messiah is the *New*. Hence, from signifying the two religious dispensations, they came soon to denote the books in which what related to these dispensations was contained; the several writings of the

## TESTAMENT.

Jews being called *ἡ πάλαια διαθήκη*, and the writings super-added by the apostles and evangelists, *ἡ καινὴ διαθήκη*.

The New Testament consisted very anciently of two codes or collections, called gospels and epistles. This was the case in the time of Ignatius, and also in the time of Tertullian, who distinguishes the gospels by the names of the writers, and calls them our "Digesta," or digests, in allusion, as it seems, to some collection of the Roman laws digested into order. As to the order of the several gospels, it appears, that in Tertullian's time they were disposed, at least in the African churches, according to the quality of the writers; those two occurring first which were written by apostles, and then the other two written by apostolical men. In some of the most ancient MSS. now extant, the order of the several evangelists is thus; Matthew, John, Luke, Mark. The order of the four gospels has been generally this: Matthew, Mark, Luke, John; then follow the Acts, St. Paul's epistles, the Catholic epistles, and the Revelation. It sufficiently appears, from a variety of considerations suggested by the excellent Dr. Lardner, that the books of the New Testament, consisting of a collection of sacred writings, in two parts, one called Gospel or Gospels, or Evangelicon; the other Epistles, or Apostle or Apostles, or Apostolicon, were only known, read, and made use of by Christians. (See CANON.) It has been a subject of some dispute, whether any sacred books of the New Testament have been lost; but there are many considerations, tending to satisfy us, that no sacred writings of the apostles of Christ are lost.

The four gospels, in our possession, were written for the benefit of those who would undoubtedly receive them with respect, keep them with care, and recommend them to others; and if any other such authentic histories of Jesus Christ had been written by apostles, or apostolical men, they would have been received, and preserved in like manner. The book of the Acts, which we still have, was the only authentic history of the preaching of the apostles after our Lord's ascension, which they had in their hands, or had heard of; consequently there was no other such history to be lost. The epistles of Paul, James, Peter, John, Jude, were sent to churches, people, or particular persons, who would shew them great regard when received, would carefully preserve them, and readily communicate them to others, that they might take copies of them, and use them for their establishment in religion and virtue; and if other such epistles had been written, the case would have been much the same, nor could any of them have been easily lost. Besides, the apostles and evangelists, who drew up any writings for the instruction or confirmation of Christian people, must have been careful of them. Upon the whole, we have no sufficient reasons for believing, that any sacred writings of the New Testament have been lost. All the books of the New Testament were written in Greek, except the gospel of St. Matthew, who, according to St. Jerom, first wrote in Judea in the Hebrew language. Tertullian, as well as many other ancient writers, afford us various testimonies to the integrity and genuineness of the gospels and other books of the New Testament in his time, as well as to their divine inspiration. See BIBLE.

Although the New Testament was written in Greek, an acquaintance with the Greek classics will not be found so conducive to the interpretation of it, as an acquaintance with the ancient Hebrew scriptures. The propriety of its being written in the Greek language will appear from the following historical fact. After the Macedonian conquests, and the division which the Grecian empire underwent among the commanders on the death of their chief, Greek soon

became the language of the people of rank through all the extensive dominions which had been subdued by Alexander. The persecutions with which the Jews were harassed under Antiochus Epiphanes, concurring with several other causes, occasioned the dispersion of a great part of their nation throughout the provinces of Asia Minor, Assyria, Phœnicia, Persia, Arabia, Libya, and Egypt; which dispersion was in process of time extended to Achaia, Macedonia, and Italy. The unavoidable consequence of this was in a few ages, to all those who settled in distant lands, the total loss of that dialect, which their fathers had brought out of Babylon into Palestine, excepting only amongst the learned. At length a complete version of the scriptures of the Old Testament was made into Greek; a language which was then, and continued for many ages afterwards, in far more general use than any other. (See SEPTUAGINT.) The Jews, who inhabited Grecian cities, where the oriental tongue was unknown, would be naturally anxious to obtain copies of this translation. Wherever Greek was the mother-tongue, this version would be gradually adopted into use not only in private in Jewish houses, but also in public in their schools and synagogues, for the explanation of the weekly lessons from the law and the prophets. The style of it would consequently soon become the standard of language to them with regard to religious subjects. Hence would arise a certain uniformity in phraseology and idiom among the Grecian Jews, wheresoever dispersed, in respect of their religion and sacred rites, whatever might be the particular dialects which prevailed in the places of their residence, and were used by them in conversing on ordinary matters. From the conformity and peculiarity in language now noticed, some critics, in order to distinguish the idioms of the LXX and New Testament from that of common Greek, have termed it *Hellenistic*; which see. Under that article we have intimated, that the habit which the apostles and evangelists had of reading the scriptures, and hearing them read, whether in the original or in the ancient version; would, by infecting their style, co-operate with the tendency which, as natives of Palestine, they would derive from conversation, to intermix Hebraisms and Chaldaisms in their writings. Some modern writers, whilst they have adverted to this circumstance, have defended the diction of the sacred penmen of the New Testament, and extolled it as altogether pure and elegant. Among these we may reckon Pfochenius and Blackwall, who, with this view, have made diligent researches among the writings of the ancient Greeks, for the discovery of words and phrases, which might appear to resemble what has been accounted Hebraism or Syriacism in the New Testament. Whereas the writings of the New Testament carry, in the very expression and idiom, an intrinsic and irresistible evidence of their authenticity. They are such as, in respect of style, could not but have been written by Jews, and hardly even by Jews superior in rank and education to those whose names they bear; and yet, under this homely garb, we find the most exalted sentiments, the closest reasoning, the purest morality, and the sublimest doctrine.

Abstracting from that lowly kind of beauty in language, which results from its softness and harmony, considered as an object to the ear, every excellency of style is relative, arising solely from its fitness for producing, in the mind of the hearer, the end intended by the writer. Now in this view it is evident, that a style and manner may, to readers of one denomination, convey the writer's sentiments with energy as well as perspicuity, which, to those of a different denomination, would convey them feebly, darkly, and, when judged by their rules of propriety, improperly. This seems to have been actually the case with the writers of the

New

New Testament. The language of Matthew, Mark, Luke, and John, is better adapted to the readers, for whose use the Gospels and Acts were at first composed, than the language of Plato or Demosthenes would have been.

If we would enter thoroughly into the idiom of the New Testament, we must familiarise ourselves to that of the Septuagint; and if we would enter thoroughly into the idiom of the Septuagint, we must accustom ourselves to the study, not only of the original of the Old Testament, but of the dialect spoken in Palestine between the return of the Jews from the Babylonish captivity, and the destruction of Jerusalem by the Romans; for this last, as well as the Hebrew, has affected the language both of the old Greek translation and of the New Testament.

Such is the origin and the character of the idiom, which prevails in the writings of the apostles and evangelists, and the remarkable conformity of the new revelation we have by them, though written in a different language, to the idiom of the old. It has been distinguished in the former by the name Hellenistic, not with critical accuracy, if regard be to the derivation of the word, but with sufficient exactness, if attention be given to the application which the Hebrews made of the term Hellenist, by which they distinguished their Jewish brethren, who lived in Grecian cities and spoke Greek. It has been by some of late, after father Simon of the Oratory, more properly termed the Greek of the synagogue. It is acknowledged, that it cannot strictly be denominated a separate language, or even dialect, when the term dialect is conceived to imply peculiarities in declension and conjugation. But, with the greatest justice, it is denominated a peculiar idiom, being not only Hebrew and Chaldaic phrases put in Greek words, but even single Greek words used in senses in which they never occur in the writings of profane authors, and which can be learnt only from the extent of signification given to some Hebrew or Chaldaic word, corresponding to the Greek in its primitive and most ordinary sense. This difference in idiom constitutes a difficulty of another kind from that which is created by a difference in dialect; a difficulty much harder to be surmounted, as it does not affect the form of the words, but the meaning.

It is pertinent, however, to observe, that the above remarks on the Greek of the New Testament, do not imply that there was any thing which could be called idiomatical or vulgar in the language of our Lord himself, who taught always in his mother tongue. His apostles and evangelists, on the contrary, who wrote in Greek, were, in writing, obliged to translate the instructions received from him into a foreign language of a very different structure, and for the use of people accustomed to a peculiar idiom. The apparently respectful manner in which our Saviour was accosted by all ranks of his countrymen, and in which they spoke of his teaching, shews that he was universally considered as a person of eminent knowledge and abilities. It was the amazing success of his discourses to the people, in commanding the attention and reverence of all who heard him, which first awakened the jealousy of the scribes and pharisees.

Although all the writers of the New Testament wrote in the idiom of the synagogue, we are not to conclude from hence, that there is no discernible diversity in their styles. As the same language admits of a variety of dialects, and even of provincial and foreign idioms, so the same dialect and the same idiom are susceptible of a variety of styles. The style of Paul has something peculiar, by which, in our opinion, there would be no difficulty in distinguishing him from any other writer. A discerning reader would not

readily confound the style of Luke with that of either of the evangelists who preceded him, Matthew or Mark; and still less would he mistake the apostle John's diction for that of any other penman of the New Testament. The same differences of style will be discovered by one who is but moderately conversant in Hebrew in the writers of the Old Testament. In it we have still greater variety than in the New. Some of the books are written in prose and some in verse: and in each, the differences between one book and another are considerable. In the book of Job, for instance, the character of the style is remarkably peculiar. What can be more dissimilar in this respect, though both are excellent in their kind, than the towering flights of the sublime Isaiah, and the plaintive strains of the pathetic Jeremiah? In the books of Scripture we can specify the concise style and the copious, the elevated and the simple, the aphoristic and the diffuse.

How this diversity of style is reconcileable with the idea of inspiration, we have attempted to shew under the article INSPIRATION. See Campbell's Prelim. Diff.

For other particulars in connection with the subject of this article, see BIBLE and CANON.

TESTAMENTARY ADOPTION. See ADOPTION.

TESTAMENTARY Causes, in Law, are those that relate to testaments, which were originally cognizable in the king's courts of common law, viz. the county-courts; and afterwards transferred to the jurisdiction of the church, by the favour of the crown, as a natural consequence of granting to the bishops the administration of intestates' effects. This spiritual jurisdiction of testamentary causes is a peculiar constitution of this island; for in almost all other (even in popish) countries, all matters testamentary are of the jurisdiction of the civil magistrate. And that this privilege is enjoyed by the clergy in England not as a matter of ecclesiastical right, but by the special favour and indulgence of the municipal law, and as it should seem by some public act of the great council, is freely acknowledged by Lindwode, the ablest canonist of the fifteenth century; and about a century before, in a canon of archbishop Stratford; also by the constitutions of cardinal Othobon; and likewise by archbishop Parker, in the time of queen Elizabeth. At what period of time the ecclesiastical jurisdiction of testaments and intestacies began in England, is not ascertained by any ancient writer. It appears the foreign clergy were early ambitious of this power, though they were curbed by the edict of the emperor Justin, which restrained the intimation or probate of testaments (as formerly) to the office of the *magister census*: but afterwards by the canon law it was allowed, that the bishop might compel, by ecclesiastical censures, the performance of a bequest to pious uses. And therefore it fell within the jurisdiction of the spiritual courts, by the express words of the charter of king William I. which separated those courts from the temporal. And afterwards, when king Henry I. by his coronation-charter, directed that the goods of an intestate should be divided for the good of his soul, this made all intestacies immediately spiritual causes, as much as a legacy to pious uses had been before. This therefore, says judge Blackstone, we may possibly conjecture, was the era referred to by Stratford and Othobon, when the king, by the advice of the prelates, and with the consent of his barons, invested the church with this privilege.

This jurisdiction is principally exercised with us in the consistory courts of every diocesan bishop, or in the prerogative court of the metropolitan originally; and in the arches court, and courts of delegates by appeal. It is divisible into three branches; the probate of wills, the granting of administrations, and the suing for legacies. The two former

former of which, when no opposition is made, are granted merely *ex officio et debito justitiæ*, and are then the object of what is called the voluntary, and not the contentious jurisdiction. But when a caveat is entered against proving the will or granting administration, and a suit thereupon follows, in order to determine either the validity of the testament, or who hath a right to the administration, this claim and obstruction are remedied by the sentence of the spiritual court, either by establishing the will, or granting the administration. Blackstone's Com. vol. ii. See SUBTRACTION of Legacies.

TESTAMENTARY Guardian, Succession, and Tutorage. See the substantives.

TESTAMENTO Annexo, Administration cum. If a testator makes his will, without naming any executors, or if he names incapable persons, or if the executors named refuse to act; in any of these cases, the ordinary must grant administration *cum testamento annexo*, to some other person.

TESTAMENTS of the Twelve Patriarchs, in Ecclesiastical History, a kind of apocryphal or supposititious book, in which those patriarchs are introduced, speaking their last dying words, containing predictions of things future, and rules of virtue and piety; which they deliver to their sons as a choice treasure, to be carefully preserved, and to be delivered by them to their children. We have several editions of these in Latin; they were first published in Greek, by Grabe, and from his edition republished by Fabricius; and translated into English by Mr. Whiston. Cave places the anonymous author of this book in the year 192, or nearer the beginning of the second century. They are cited by Origen, and, therefore, were probably written before his time. Grabe thinks they were written before the time of our Saviour, and afterwards interpolated by a Christian. But Mr. Whiston asserts, that they are really genuine, and one of the sacred apocryphal, or concealed books of the Old Testament. Cave supposes that this book was written by a judaizing Christian; Grabe apprehends that it was written in Hebrew: Beaufobre is of opinion that it was forged at the end of the first, or beginning of the second century, by some Christian converted from Judaism, and he suspects that the author was an Ebionite, and that he believed Jesus to be the son of Joseph and Mary. Dr. Lardner is positive that these testaments are not the real last words of the twelve patriarchs; but the clear knowledge of Christian affairs and principles shews this book to have been written, or else very much interpolated, after the publication of the Christian religion. He says, there is nothing in this work that might not have been written by a learned Jew of the second century or later, though he thinks that the author was a Christian, and well versed in the Jewish learning: and moreover he is of opinion, that he is placed early enough by Cave, at the year 192. Lardner's Works, vol. ii.

TESTATOR, or TESTATRIX, the person who makes his or her will and testament.

M. Gillet shews, that a person incapable of a legacy cannot demand any sum which the testator in his testament declares himself indebted to him in; in regard such a declaration of debt is presumed a fraud against the intention of the law.

TESTATUM, in Law, a writ in personal actions; where, if the defendant cannot be arrested on a *capias* in the county where the action is laid, but is returned *non est inventus* by the sheriff, this writ shall be sent into any other county, where such person is thought to be, or to have wherewithal to satisfy the demand.

It is called *testatum*, because the sheriff has before testified, that the defendant was not to be found in his bailiwick.

TESTE, a term commonly used in the close of a writ, where the date is contained, which begins with *Teste meipso*, if it be an original writ; or, if judicial, *Teste*, the lord chief justice, &c. according to the court whence it comes. In some ancient formulas, we read *Teste custode Angliæ*. There must be at least fifteen days between the teste and return of every process awarded from the king's bench into any foreign county. See WRIT.

TESTENICH, in Geography, a small island in the gulf of Venice. N. lat. 44° 54'. E. long. 14° 47'.

TESTER. See TESTON.

TESTES, TESTICULI, in Anatomy; quia virilitatem testantur; glandular bodies, peculiar to the male sex of animals, serving the office of secreting the fecundating fluid: hence their removal deprives an animal of the power of propagating its kind. See GENERATION, Male Organs of.

The testes are wanting in most of the fish kind. The spinose fishes in general have neither testes nor paratastæ; but all the cetaceous fishes have them, and not a few of the cartilaginous kinds. Those fish that have them, have always two, as in land-animals; but they differ much in figure and situation in the several kinds, particularly in the whale and flat-fish. See Anatomy of FISH.

TESTES of the Brain, two small hemispherical eminences, situated at the posterior and inferior aspect of the optic thalami, and now more generally known, together with two very similar ones immediately above them, by the name of tubercula quadrigemina. See BRAIN.

TESTES Synodales. See SYNODALES.

TESTI, FULVIO, Count, in Biography, an Italian poet, was born in 1593, at Ferrara, and settling, when young, at Modena, he rose to the highest offices and honours of the state. Nevertheless, alternate prosperity and adversity visited him: inconstant and ambitious, he fell into disgrace with Francis I. who imprisoned him in the citadel of Modena, where he died in 1646. His poems are chiefly of the lyric class. The productions of his maturer judgment are distinguished above those of his contemporaries for vigour and poetical spirit; and some of them, with respect to elevation of sentiment and beauty of imagery, will bear comparison with the productions of the best Italian poets. He also attempted tragedy in two compositions, intitled "Arinda," and "L'Isola d'Alcina;" but their style is lyric rather than dramatic composition. Tiraboschi. Gen. Biog.

TESTIBUS HIIS. See HIIS.

TESTICLE, TESTIS, in Anatomy. See GENERATION.

TESTICLE, *Diseased*, in Surgery. See SARCOCELE, HYDROCELE, FUNGUS of the Testicle, FUNGUS Hematodes, HERNIA Humoralis, &c.

TESTICLE, *Operation of removing*. See CASTRATION.

TESTIGOS, LOS, in Geography, a cluster of small islands, about ten leagues from the continent of South America, and the same distance from the island of Grenada. N. lat. 11° 45'. W. long. 62° 5'.

TESTIMON, a town of Prussia, in the province of Ermeland; 16 miles S.S.E. of Hillberg.

TESTIMONIAL, a kind of certificate, signed either by the matter and fellows of the college, where a person last resided, or by three, at least, reverend divines, who knew him well for three years last past; giving an account of the conduct and learning of the person.

Such a testimonial is always required before holy orders are conferred; and the bishop even ordinarily demands one of a priest before he admits him to a benefice.

TESTIMONIAL is also a certificate under the hand of a justice of peace, testifying the time and place when and where

a soldier or mariner landed, and the place of his dwelling, and whither he is to pass.

**TESTIMONY.** See EVIDENCE.

Testimony is a serious intimation from another of any fact or observation, as being what he remembers to have seen, heard, or experienced. The evidence of testimony is either oral or written. Some have unreasonably supposed, that this kind of evidence is solely and originally derived from experience. With regard to this it may be observed, that the evidence of testimony is to be considered as strictly logical, no farther than human veracity, in general, or the veracity of witnesses of such a character, and in such circumstances in particular, is supported, or hath not been refuted by experience. But that testimony, antecedently to experience, hath a natural influence on belief, is undeniable, in which respect it resembles memory. And in what regards single facts, it is a more adequate evidence than any conclusions from experience. When experience is applied to the discovery of the truth in a particular incident, the evidence is called *presumptive*; whereas ample testimony is accounted a positive proof of the fact. Testimony is capable of giving us absolute certainty even of the most miraculous fact, or of what is contrary to uniform experience. To this, when we have no positive reasons of mistrust or doubt, we are, by an original principle of our nature (analogous to that which compels our faith in memory), led to give an unlimited assent. As on memory alone is founded the merely personal experience of the individual, so on testimony, in concurrence with memory, is founded the much more extensive experience, which is not originally our own, but derived from others. See on this subject Campbell's *Philos. of Rhet.* vol. i. book i. chap. 5. and *Dissertation on Miracles*, part i. sect. i. and i. See FAITH.

For the credibility of human testimony, see CERTITUDE.

**TESTINA**, in *Ancient Geography*, a town of Italy, belonging to the Sabines, placed by D'Anville S.W. of Amiternum.

**TESTING**, in *Metallurgy*, denotes the operation of refining large quantities of gold and silver, by means of lead, in the vessel called a *test*. This operation is performed by the destruction, vitrification, and scorification of all the extraneous and destructible metallic substances with which those noble metals are alloyed. It consists in adding to the alloyed gold and silver, a certain quantity of lead, and in expoling afterwards this mass to the action of the fire. The lead, by increasing the proportion of imperfect metals, prevents them from being so well covered and protected by the perfect metals; by uniting with these, it communicates to them a property it has of losing very easily a great part of its inflammable principle; and lastly, by its vitrifying and fusing property, which it exercises with all its force upon the calcined and naturally refractory parts of the other metals, it facilitates and accelerates the fusion, the scorification, and separation of these metals. The lead, which in this operation is purified, and scorifies along with it the imperfect metals, separates from the metallic mass with which it is then incapable of remaining united: it floats upon the surface of the melted mass; because by losing part of its phlogiston, (according to the former language of chemists,) it loses also part of its specific gravity, and lastly it vitrifies. The removal of the vitrified matter in the process is procured either by the nature of the vessel in which the melted matter is contained, and which, being porous, absorbs and imbibes the scorified matter as fast as it is formed; or by a channel cut in the edge of the vessel through which the matter flows out.

The process of testing is generally performed in the same manner as that of cupellation. See ASSAYING and COPELLING.

But when great quantities of base metal are to be worked off from a little gold, recourse is had to a more expeditious method, that of testing before the bellows. An oval test is placed in a cavity, made in a hearth of a convenient height, and some moistened sand or ashes pressed round it to keep it steady: the nose of a bellows is directed along its surface, in such a manner, that if ashes are sprinkled in the cavity of the test, the bellows may blow them completely out; some have an iron plate fixed before the bellows, to direct the blast downwards. To keep the surface of the test from being injured in putting in the metal, some cloths or pieces of paper are interposed. The fuel consists of billets of barked oak, laid on the sides of the test, with others laid cross-wise on these: the bellows impels the flame on the metal, clears the surface of ashes or sparks of coal, hastens the scorification of the lead, and blows off the scoria, as fast as it is formed, to one end of the test, where it runs out through a notch made for that purpose. About two-thirds of the scorified lead may be thus collected; the rest being partly absorbed by the test, and partly dissipated by the action of the bellows. Care must be taken not to urge the blast too strongly, lest some portion of the gold should be carried away by the fumes impetuously forced off from the lead, and some minute particles of it entangled and blown off with the scoria. Macquer's *Chem. Dict. Art. Refining*. Lewis's *Ph. Techn.* p. 146.

**TESTO**, Ital. literally *test*. In *Music* it implies a subject, or words of a song, or other vocal composition, to which some air, melody, or harmony, is to be composed.

It is a matter of great concern to understand well how to appropriate or adapt the music to the words of a song, to express the sense, and make a just application of the long and short syllables to the notes and time with which they are to be connected.

But this branch of the science, which depends greatly on the knowledge of poetry, has lain a long time almost unregarded; and even at present, very little care is taken in this point in the modern music, which is somewhat wonderful, since it was to this that the ancients attributed the extraordinary effects of their music; for by them this branch was most accurately observed, and by this they regulated and governed their measures, so that they might produce the desired effects; and some philosophers say, the human passions and affections. Vossius de *Poem. Cantu*, &c.

**TESTON**, **TESTER**, the name of a coin struck in France by Louis XII. in 1513, and in Scotland in the time of Francis II. and Mary queen of Scotland, so called from the head of the king, (*teste* or *tête*,) which was engraved upon it. The silver it contained was 11 deniers 18 grains; its weight, 7 deniers 11½ grains; and its value 10 sols. The coinage of it was prohibited by Henry III. in 1575, when the value of it was augmented to 14 sols 6 deniers. *Encycl.*

A remarkable Scottish medal of this kind was that inaugurative of Francis II. of France with Mary of Scotland, though it is more properly indeed French, being, as it is thought, struck upon their coronation, as being a queen of that country. It presents busts of Francis and Mary, face to face, with three legends around them, the outermost of which contains their titles, the middle one this singular sentence,

“Which wonders how the devil it got there:”

**HORA NONA DOMINUS HIC EXPIRAVIT HELLI CLAMANS**, a most ominous motto, one would imagine, to a superstitious ear. The innermost legend is only the name of the city of Paris. There are fine French testoons of Francis and Mary, likewise presenting them face to face, with the arms of France

France and Scotland upon the reverse, as is also the case of the medal just mentioned. These pieces are so fine and rare, that Dr. Hunter gave ten guineas for the one in his cabinet, which contains as vast and well-chosen a private collection, of all sorts of coins and medals, as any in the world.

Testoons, or shillings, were first coined in Scotland about the year 1553, and they bore the bust of the queen and the arms of France and Scotland on the reverse: they were of the same intrinsic value with those of England, and were worth four shillings; the half-testoon two, Scottish money. The silver testoon of Mary, chiefly of 1553 or 1562, with her bust, are rare, worth about 30s.; half still more rare, valued at 3*l*. Pinkerton on Medals.

The teston, testoon, or tester, among us, succeeded the groat, which was introduced by Edward III. in 1354. It was also called shilling, and first coined by Henry VII. in 1503; and was rated at 12*d*. in the reign of Henry VIII. and afterwards reduced to 6*d*. The testoon of the first year of Edward VI. is extremely rare.

TESTOON, or TESTONE, a silver coin in Italy, and also in Portugal. At Florence, the testoon, or testone, as a money of account and a silver coin, is worth two lire, or three paoli. The testoon is a money of account at Lisbon, and is valued at 100 rees. And of the gold coins struck since 1722, there are the Dezefeis testoon of 1600 rees, and the Oito testoon of 800 rees. The silver coins are testoons of 100 and halves of 50 rees.

At Rome the scudo, as a money of account, is divided into 3½ testoni; and among the silver coins, the testoni are valued at 3 paoli, the paoli being worth 5¼*d*. sterling nearly. See COIN.

TESTORE, CARLO GIOVANNI, in *Biography*, a violinist and music-malter, resident at Versailles in 1770. In 1767 he published a treatise on music, entitled, "Musica ragionata," in 4to. This author was perhaps the first Italian who adopted Rameau's principles. He simplified his rules, and made his treatise more intelligible to *principiante* than Rameau himself, or his scientific commentator d'Alembert. The full title of his book is "La Musica ragionata espressa familiarmente in dodici Passaggiate a Dialogo, ornati 140 essempli Musicali in rami."

TESTOURE, in *Geography*, a town of Africa, in the country of Tunis, on the Mejerdah; 40 miles S.W. of Tunis.

TESTUDO, in *Antiquity*, was particularly used among the poets, &c. for the ancient lyre, or lyre of Amphion; because it was said to have been originally made, by its inventor Mercury, of the back or hollow shell of a testudo aquatica, or sea-tortoise, which he accidentally found on the banks of the river Nile.

Mr. Molyneux has an express discourse, in the Philosophical Transactions, to shew that the tortoise-shell was the basis of the ancient lyre, and that the whole instrument had thence the denomination testudo; which account throws some light on an obscure passage in Horace, ode iii. lib. 4. mistaken by all the commentators:

"O, testudinis aureæ  
Dulcem quæ strepitum, Pieri, temperas!  
O mutis quoque piscibus  
Donatura cygni, si libeat, sonum!"

TESTUDO, *Tortoise*, in the *Military Art of the Ancients*, was a kind of cover, or screen, which the soldiers, *e. gr.* a whole company, made themselves of their targets, by holding them up over their heads, and standing close to each other.

Thus, if we suppose the first rank to have stood upright

on their feet, and the rest to have stooped lower and lower by degrees, till the last rank kneeled down on their knees, so that every rank covering with their targets the heads of all in the rank before them, they represented a tortoise-shell, or a sort of sloping roof.

This expedient served to shelter them from darts, stones, &c. thrown upon them, especially those thrown from above when they went to the assault. It was also used in field-battles as well as in sieges.

TESTUDO was also a kind of large defensive engine, of an oval figure, composed of boards, and wattled up at the sides with wicker, which moved on several wheels, serving to shelter the soldiers when they approached the walls to mine them, or to batter them with rams.

TESTUDO, in *Medicine*, denotes a soft broad tumour, or gathering of impure humours between the skull and the skin, called also *talpa*, as resembling the subterraneous windings of the tortoise or mole.

TESTUDO, *Tortoise*, in *Zoology*, a genus of animals of the class of Amphibia and order of Reptiles; the generic characters of which are, that the body is furnished with a tail, and defended by a bony or coriaceous integument above and below, or above by scales; and that the upper mandible of the mouth closes over the lower; without distinct or proper teeth, the teeth, as they are called in the generality of tortoises, being no other than the serratures of the mandibles.

Gmelin enumerates thirty-three species, which are distributed into the three classes of *marine*, *fluvialile*, and *land* tortoises.

A. *Marine Tortoises, or Turtles with pinniform Feet, the former being longer.*

The animals of this class are distinguished from the land tortoises by their very large and long fin-shaped feet, in which are inclosed the bones of the toes, the first and second on each foot being furnished with visible or projecting claws, the others not appearing beyond the edge. The shield, as in the land tortoises, consists of a strong bony covering, in which are imbedded the ribs, and which is coated externally by hard horny plates, in one or two species much thicker and stronger than those of the land tortoises. Mr. Schæpf, cited by Dr. Shaw, observes, that the apparent number of claws or projecting extremities on the feet of the marine tortoises, appears to be no certain criterion of the species; but, on the contrary, is found to vary so as to contradict the Linnæan specific characters.

#### Species.

CORIACEA; Coriaceous Tortoise. Striated lengthwise; or brown turtle, paler beneath, with coriaceous shell, marked by five longitudinal tuberculated ribs. This is the largest of the marine tortoises, being found eight feet long, and one thousand pounds in weight. It is larger than others of its tribe, and its external covering differs by not being horny, but resembling strong leather, marked over the surface into small, obscurely subhexagonal and pentagonal divisions, without destroying its general smoothness. The longitudinal ribs or ridges are five; and comprehending those that border the sides, the number is seven. It has no under or thoracic shell; the head is large, and the upper mandible notched at the tip, so as to exhibit the appearance of two large teeth, between which, when the mouth is closed, is received the tip of the lower mandibles: the fins are large and long, and covered with a tough leathery skin; the tail is rather short and sharp-pointed. This species is a native of the Mediterranean, and has occasionally been taken on the coasts both of France and England. It is also found, not only in the European

ropean seas, but in those of South America, and about some of the African coasts. The Greeks, according to Cépède, were well acquainted with this specimen, and used it in the construction of the lyre or harp. (See TESTUDO, in *Antiquity*.) Pennant says, that this species is extremely fat, but the flesh coarse and bad; but the Carthufians will eat no other species. The small sea tortoise described by Pennant in the *Phil. Trans.* for 1771, is said to be the young of this animal. Gmelin mentions this and another as varieties.

**IMBRICATA.** The imbricated or variegated turtle with thirteen imbricated scales on the disk; these lap over each other at the extremities like tiles on the roof of a building. The head is smaller than in other turtles; the neck longer; and the beak narrower, sharper, and more curved, so as considerably to resemble the bill of a hawk, and from this circumstance the animal derives its popular name of the "hawkbill turtle." This turtle is a native of the Asiatic and American seas, and is sometimes found in the Mediterranean. It has been often known to measure five feet in length, and to weigh 500 or 600 pounds. In the Indian ocean it attains a prodigious size. Its shell was anciently used for a shield, and still serves for that purpose among barbarous nations. The flesh is not esteemed as a food; the lamellæ or plates of the shell, being much stronger, thicker, and clearer than those of any other kind, constitute its sole value. See *TORTOISE-Shell*.

**MYLAS.** Brownish turtle, with thirteen scales on the disk; the green turtle of some writers, with two nails on the fore-feet, and single ones on the hind-feet. This common green turtle (etculent turtle), is so named from the green tinge, derived from the vegetable substances on which it feeds, often exhibited by its fat, when the animal is in its highest perfection. It is one of the largest of this genus, often measuring above five feet in length (sometimes more than six), and weighing more than 500 or 600 pounds. Its colour is a dull palish brown, variegated with deeper undulations, but not exhibiting the beautiful colours which distinguish the *T. imbricata*. Its flesh, however, is in such estimation, that the inhabitants of the West Indian islands have long considered it as one of the most excellent articles of food, and have introduced a similar taste into some of the European nations. In our own country it is much esteemed, and considerable quantities of it are imported to supply the luxury of the metropolis. Its introduction, however, cannot be traced farther than about 50 or 60 years backward. Sir Hans Sloane informs us, in his *History of Jamaica*, that forty sloops were employed by the inhabitants of Port Royal, in Jamaica, for catching them, and that the markets there are supplied with turtle as ours are with butcher's meat. The method of taking them at the Bahama islands is by striking them with a small iron peg two inches long, put in a socket at the end of a staff twelve feet long. Two men usually set out for this work in a little light boat or canoe, one to row and gently steer the boat, while the other stands at the head of it with his striker. The turtle are sometimes discovered by their swimming with their head and back out of the water, but they are oftener discovered lying at the bottom, a fathom or more deep. If a turtle perceives he is discovered, he starts up to make his escape, the men in the boat pursuing him, endeavour to keep sight of him, which they often lose, and recover again by the turtle putting his nose out of the water to breathe: thus they pursue him, one paddling or rowing, while the other stands ready with his striker. It is sometimes half an hour before he is tired; then he sinks at once to the bottom, which gives them an opportunity of striking him, which is by piercing him with an iron peg, which slips

out of the socket, but is fastened with a string to the pole. If he is spent and tired by being long pursued, he tamely submits, when struck, to be taken into the boat or hauled ashore. There are men who by diving will get on their backs, and by pressing down their hind parts, and railing the fore-part of them by force, bring them to the top of the water, while another slips a noose about their necks.

The sea tortoises, or turtles, says Catesby, never go on shore but to lay their eggs, which they do in April: they then crawl up from the sea above the flowing of high water, and dig a hole above two feet deep in the sand, into which they drop in one night above an hundred eggs, at which time they are so intent on Nature's work, that they regard none that approach them; but will drop their eggs into a hat, if held under them; but if they are disturbed before they begin to lay, they will forsake the place, and seek another. They lay their eggs at three, and sometimes at four different times; there being fourteen days between every time; so that they hatch and creep from their holes into the sea at different times also. When they have laid their complement of eggs, they fill the hole with sand, and leave them to be hatched by the heat of the sun, which is usually performed in about three weeks. It may be proper to add, that the eggs are about the size of tennis-balls, round, white, and covered with a smooth parchment-like skin. Gmelin mentions several varieties of this species.

**CARETTA.** The variegated turtle, with fifteen dorsal scales, those of the middle range gibbous towards their tips. This species is larger than any yet discovered, except perhaps the *coriacea*. It is called the "loggerhead turtle;" and though it resembles the last species, or green turtle, it is distinguished by the superior size of the head, the proportional breadth of the shell, and by its deeper and more variegated colours: but the principal distinction consists in the number of dorsal segments or scutella of the shell, which amount constantly to fifteen. The fore-feet are very large and long; the hind-feet much shorter, though broad. In a commercial view, this species is of little importance; its flesh being rank and coarse, and the laminae of the shell too thin for general use. It is said, however, to afford a good quantity of oil, which may be used for lamps, &c. This turtle is very strong and fierce, and even dangerous. It is an inhabitant of the same seas with the green turtle, but has been found in remote latitudes, even in the Mediterranean, and particularly about the coasts of Italy and Sicily.

**MACROPUS.** With an ovate, carinate, emarginate shield, and the feet very large and bifariously unguiculated.

B. *Fluvioatile, with palmated feet, shell joined with the sternum by a membrane, and supported in the middle on both sides by two processes of the sternum.*

**ORBICULARIS.** The *T. europea* of Schneider, with oval, flattish, smooth, dark brown shell, marked with very numerous yellowish specks and streaks. This speckled tortoise of the "*Naturalist's Miscellany*," or *T. meleagris*, is of small size, the shell measuring about four or five inches in length, and its disk composed of thirteen, and the margin of twenty-five pieces; the under shell whitish-yellow, tinged towards the joints with brown; the head ovate, somewhat convex above, and flattish on each side and beneath; the skin of the neck lax and wrinkly; the legs short and scaly, feet webbed, fore-feet having five toes and hinder only four; the claws on all the feet sharp-pointed, and crooked; the tail nearly half as long as the body, thin, attenuated, compressed and scaly, and also spotted like the body.

This elegant species is a native of many parts of Europe, being

## TESTUDO.

being found in Italy, Sardinia, France, Hungary, Prussia, &c. inhabiting lakes and muddy waters, and feeding on aquatic plants, insects, snails, and small fish. The flesh is said to be good as food, for which purpose it is sold in the markets, and occasionally kept in ponds, and fed or fattened with lettuce-leaves, bread, &c. &c. It may be conveniently kept in a cellar and fed with oats, scattered on the floor, which it greedily eats when they begin to germinate. It deposits its eggs in sandy and funny places in the beginning of spring, which are not hatched, as it is pretended, till the succeeding spring.

**MEMBRANACEA.** With three claws on the feet, and shell striated on the back, membranaceous, ovate and grey. Found in the sea that washes Guiana. See *T. FEROX*.

**TRIUNGUIS.** With three claws on the feet, the disk of the back rugose and orbiculated, the lower border smooth, and nostrils in a cylinder elevated above and projecting beyond the head. Found rarely in the Nile, and supposed to be the same with the former.

**CARTILAGINEA.** Shell orbicular, membranaceous, striated on the back; three claws on the feet, and nose cylindrical and prolonged. This is the *T. Boddaerti* and a rare species. See the next article.

**FEROX**; *Fierce* Tortoise. With ovate, cartilaginous shell; three claws on the feet, and tubular, prominent nostrils. Dr. Shaw queries whether the *T. rostrata* of Schœpf, the *T.* with palmated feet, &c. of Thunberg, the *T. cartilaginea* of Boddaert, the *T. Boddaerti* of Schneider, the *T. triunguis* of Forskal, and the *T. membranacea* of Blumenberg, do not belong to this species. This is a remarkable species, and distinguished by the unusual nature of its shield, which is hard and ossaceous only in the middle part, while the edges gradually degenerate into a flexible coriaceous verge; obscurely marked with five or six transverse bands, and granulated with small warts or prominences, gradually enlarging as they approach the flexible edge; the head rather small, somewhat trigonal, with the snout much lengthened, and the upper part drawn out into a sub-cylindric form, terminated by the nostrils, and projecting much beyond the lower mandible; the neck, when retracted, thick, and surrounded with many folds of skin, but when exerted, equal in length to that of the whole shell; the legs short, thick, and covered with a wreathed skin; the feet furnished with strong and broad webs, connecting the three last toes of each; the three first on each foot furnished with strong claws, and the remaining ones unarmed; having, besides the proper toes, two spurious ones on the hind and one on the fore feet, strengthening and expanding the web; the tail short, pointed, and curving inwards; the eyes very small and round; the colour above deep brownish-olive, and below white; the shell marked beneath in a very elegant manner, with ramifications of vessels.

This species is found in Pennsylvania, Carolina, &c. &c.; and is possessed, differently from most others of the tribe, of considerable vigour and swiftness of motion, springing towards its assailant, when attacked, with great alacrity and fierceness; about a foot and half long, and fifteen inches broad. It was first described by Dr. Garden. Its flesh is said to be extremely delicate, being equal, if not superior, even to that of the green turtle. The great soft-billed turtle, described by Mr. Bartram in his Travels, appears to be the same with this. Found in all the rivers, lakes, and pools of East Florida, weighing from 30 to 40 pounds. The *T. rostrata* of Thunberg seems to be the young of the species above described; and the *T. triunguis* of Forskal is allied to the same species. Shaw.

**SCABRA.** With smooth discoloured head, and shield oval,

convex, carinated and rough. The *scabra* of Linnæus is described as having palmated feet and flattish shell, with all the intermediate scutella elevated on the back. The shell of this species is figured by Seba; it measures about two inches and a half in length, and nearly two inches in breadth; being of a cordated figure, or somewhat pointed at the bottom. Its colour is light-reddish, variegated on the head and shell with white lines and spots; the feet marked with red specks, and having each five toes with sharp claws; the head prominent, and eyes small. Shaw.

**SQUAMATA**; *Scaly* Tortoise. With ovate body, smooth beneath, but covered above, together with the neck, feet, and tail, with numerous scales. According to Bontius, in his History of Java, this singular species is an inhabitant of fresh waters, where it burrows under the banks, in order perhaps to deposit its eggs. The Javanese call it *taunab*, or the digger, and the Chinese *lary*, or the runner, a burlesque title given to it on account of its slow pace. Its flesh is said to be extremely delicate; and the Chinese use the pulverized scales dissolved in water, as a remedy in dysenteric cases and against the colic. It is said to prey on small fish. This species seems to connect the lizard and tortoise tribes. Shaw.

**LUTARIA**; *Mud or Brown* Tortoise. With flattish shell, and tail half the length of the body; carinated, says Gmelin, behind with three scutella. This species is said to be common in many parts of Europe, as well as Asia, being found in India, Japan, &c. According to Cépède, it is not more than seven or eight inches from the tip of the nose to that of the tail, and about three or four inches in breadth; the disk consists of thirteen pieces, striated and slightly punctated in the centre, and along the middle range runs a longitudinal carina; the margin consists of twenty-three pieces, bordered with slight striæ; the colour of the shell is blackish and also of the skin; the feet are webbed, with five toes before, and four behind; the exterior toe of each foot is unarmed; the tail is stretched out in walking, from which circumstance the animal has been called "*Mus aquatilis*." Like other tortoises, it sometimes utters a kind of broken hiss. This animal is common in France, and particularly in Languedoc and many parts of Provence; and in a lake, situated in the plain of Duranee, such numbers were found as to supply the neighbouring peasantry for more than three months. Although this species be aquatic, it always lays its eggs on land, digging a hollow and covering them with mould. This animal is useful in a garden, which it frees from noxious animals, without doing any mischief itself. It may be domesticated, and kept in a basin or receptacle of water, so contrived on the edges as to give it a ready egress, when it wishes to wander about for prey. In fish-ponds it is destructive. Shaw. Gmelin mentions two varieties, *viz.* *T. tabulata* and *T. campanulata*.

**SCORPIOIDES.** See *T. FIMBRIATA*.

**HERMANNI.** With four claws on the feet, and the tip of the tail unguiculated. See *T. TRICARINATA*.

Gmelin mentions several varieties of this species.

**CAROLINA.** With digitated feet, gibbous shell, and no tail. This is the *T. clausa*, or close tortoise, of Linnæus and other writers, with blackish shell, irregularly spotted with yellow, with obtuse dorsal carina, and bivalve under-shell completely closing the upper, whence it obtains its name. The under part of the shell is so continued round the margin, that when the animal withdraws its head and legs, it is able accurately to close all parts of the shell together, so as to be perfectly secure. The defence of this little animal, which rarely exceeds four or five inches in length, is such, that it is uninjured by a weight of 500 or 600 pounds,  
and

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and able to walk under this heavy load. It is a native of many parts of North America, found chiefly in marshy situations, and occasionally in the driest and hottest places. It is principally sought for on account of its eggs, which are reckoned a delicacy. It feeds on small animals, as beetles, mice, and even serpents, which it draws into its shell, and crushes to death; and also on various vegetable substances.

**PALUSTRIS.** With depressed shell, five claws on the fore-feet, and four on the hind-feet; found in the stagnant waters of Jamaica, and seeking food in the adjoining meadows. This is the *T. terrapin* of Schœpf, and the *T. concentrica* of other writers, with sub-depressed, sub-carinated, oval yellow shell, with the scutella marked by concentric brown zones. The shell measures from four to six inches, or more. It is a native of North America, and sold in the markets at Philadelphia, and elsewhere, under the name of "Terrapin," which name is indiscriminately applied in America to several other species. It is common, as we have already said, in Jamaica, and first described by Dr. Browne, in his "History of Jamaica," who says it is a wholesome and even delicate food. In the Leverian Museum there is a large and beautiful specimen of the shell of this species. Shaw.

**CASPICA.** With orbicular shell, scaly head, five claws on the fore-feet, four on the hind, and naked tail. Gmelin represents it as a native of Hircania, inhabiting fresh waters, and sometimes growing to a vast size. The pieces composing the disk are sub-quadrate; those of the border parallelogrammic; the colour variegated with black and green; the lower shell blackish, spotted with white.

**CLAUSA.** See *T. CAROLINA*, supra.

**PENNSYLVANICA.** Tortoise, according to Schœpf, with smooth, elliptic, brown shell, with flattish back, the middle range of scutella sub-rhomboid and sub-imbricated, the first sub-triangular; and according to Gmelin, with five claws on the fore-feet and four on the hind, and the apex of the tail horny and acute. This is the small mud tortoise of Edwards; the shell measuring three or four inches in length. The head on the parts surrounding the jaws and eyes is of a reddish-yellow colour; the upper part, as well as the neck, legs, and tail, dusky; feet webbed; the tail small. It is a native of North America, and is found in Pennsylvania, &c. inhabiting muddy waters. When living, it is said to exhale a strong musky odour. Mr. Schœpf mentions a variety, and another occurs in the Leverian Museum. Shaw.

**SERPENTINA.** The snake tortoise, characterised by Schœpf as having an ovate, depressed, triply carinated, sharp-scaled shell, rounded and acutely ferrated at the posterior margin; and by Gmelin as having digitated feet, sub-carinated shell, behind obtuse, and acutely quindentated. This is the ferrated tortoise of Pennant. It is a native of North America, inhabiting stagnant waters, growing to the weight of fifteen or twenty pounds, or more, preying on fish, ducklings, &c. seizing its prey with great force, and at the same time stretching out its neck, and hissing at the same time. The head is large, depressed, triangular, and covered with a scaly and warty skin; the orbits of the eyes are oblique; the mouth wide; the mandibles sharp; the neck covered by scaly warts; the toes distinct; the tail straight, and about two-thirds the length of the shell; and the under part of the body covered by a loose, wrinkled skin, beset with smallish soft scales and granules. This animal conceals itself in muddy water, leaving out only a part of its back, and thus appearing to be a stone or other inanimate object, more easily obtains its prey. In New York it is known by the title of the "snapping tortoise."

**SPENGLERI.** See *T. SERRATA*, infra.

**FIMBRIATA.** Tortoise, according to Bruguiere, with oval, sub-convex, triply carinated shell, sub-digitated feet, cylindrical snout, and neck fimbriated on each side. This is an animal of very singular and disagreeable appearance. The shell is about fifteen inches or more in length, and its breadth eleven; but the whole animal, from the nose to the end of the tail, is two feet three inches. The head is large and flat, rounded in front, and edged on the sides with warty and wrinkled membranaceous appendages, about five inches wide, and covered behind by a three-lobed prominence; the nose resembles a proboscis, cylindrical, ten lines long, truncated, pierced by the nostrils, at the tip, where they are separated by a cartilaginous division; the eyes are round, seated at the base of the proboscis, and ten lines distant from each other; the mandibles are equal in length, and entire; the gape of the mouth is wide; the neck seven inches long, and four and a half broad; above flat and warty, and furnished on each side with six fimbriated membranaceous appendages disposed lengthwise, and alternately larger and smaller: the under part of the neck is beset with four similar appendages, placed opposite to the two on the head, and increased by two longitudinal wrinkles: the fore-feet are scaly and warty, having five indistinct toes, with as many longish sharp claws, convex above and flat beneath; the hind-feet are also scaly, with less distinct toes, having four claws, the fifth toe being unarmed, and very short: the tail is an inch long, bent slightly, and covered with a granulated skin; all the thirteen femicircular pieces, of which the shell consists, are wrinkled and irregularly notched at the hind part; the twenty-five marginal pieces are almost square, radiated on the surface with oblique wrinkles, and toothed in the interior edge. The colour of the whole is brown, somewhat paler beneath. This animal is said to be a native of Guiana, but is now rare in the rivers of Cayenne, as it has been plentifully taken by fishermen, it being considered as excellent food. It feeds on aquatic plants, and wanders by night to some distance in search of pasture. It has been suggested, but without certainty, that this is the *T. scorpioides* of Linnæus. Shaw.

**PICTA.** Tortoise with plane shell, marked on both sides with a double spot of a black-blueish colour; scutella surrounded with a yellow margin, and neck striated longitudinally with yellow and black; or tortoise with oblong, slightly convex, smooth, brown shell, with the scutella bordered with yellow. This is the cinereous tortoise of Brown's Zoology, and sufficiently distinguished from all others by the remarkable colours of the shield. This is a fresh-water species, and inhabits slow and deep rivers in North America, and should have been referred by Gmelin to his second class. In clear sunny weather these animals are said to assemble in multitudes, sitting on the fallen trunks of trees, stones, &c. and immediately plunging into the water on the least disturbance. They are said to swim very swiftly, but to walk slowly; to be able to continue many hours entirely beneath the water, but not to survive many days if kept out of their favourite element. They are very voracious, destroying ducklings, &c. which they seize by the feet, and drag under water. They are sometimes used as a food. The colour, as has been above observed, varies; being sometimes of a blackish-brown, at other times of a reddish-chestnut: the yellow markings are also either pale or deep in different individuals, and sometimes whitish; the inferior, or under edges of the upper shell, as well as the upper edges, or commissures of the lower, are elegantly streaked with black, as if artificially painted, and this variegation is continued over the skin of the sides of the body. Shaw.

**GUTTATA.** Tortoise spotted, with oblong, moderately

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convex, smooth, brown shell, with scattered yellow spots. This is *T. punctata* of Schœpf. It is a rather small species, and a native of North America, inhabiting rivers and lakes. The young are scarcely larger than pigeon's eggs, and are very black, beautifully spotted with gold colour.

**LONGICOLLIS;** Long-necked Tortoise. Smooth, ovate, with extremely long neck. This species is a native of New Holland, and is of the river or fresh-water kind. The colour of the whole animal above is deep olive-brown; beneath paler, and inclining to whitish. Shaw.

*C. Land tortoises, with clavated unguiculated feet, convex shell, and bony commissures joined with the sternum.*

**DENTICULATA.** Tortoise with sub-digitated feet, and orbicularly-cordated shell, with denticulated marginal segments. The shell is of a pale yellowish-brown colour, about four inches long and three broad, covered on the disk by broad hexagonal and pentagonal scutella, of a flattened form, with a large distinct middle space, granulated by small tubercles, and the remainder marked by five lines or furrows. The edge of the shell consists of twenty-three pieces, projecting in a serrated manner round the outline. It is supposed to be a native of North America. The feet, in Gmelin's edition of the *Systema Naturæ*, are said to be without distinct toes; and the tail short.

**GRÆCA.** The common land tortoise, with sub-digitated feet, hinder part of the shell gibbous, lateral margin very obtuse, and scutella flattish. Gmelin.

It is described by others as the tortoise with hemispheric black and yellow shell, gibbous behind; the pieces composing the disk convex, and the sides obtuse. This tortoise is supposed to be a native of almost all the countries bordering on the Mediterranean sea, and to be more frequent in Greece than in other regions. It is found in the European Archipelago islands, and in Corsica and Sardinia, and also in many parts of Africa. In Greece it is an article of food; the eggs are eaten boiled, and the blood is often swallowed recent. In September the animal hides itself under ground, and emerges in February: it lays its eggs in June, in a small hole on a sunny spot, out of which, after the first rains of September, the young are hatched. In England it retires about the end of October, and re-appears about the middle of April; but these seasons vary with the climate and weather, &c. The males often fight, butting at each other with a noise that may be heard at a considerable distance. This animal lives to a most extraordinary age, exceeding the period of even a century.

One of the most remarkable instances is that of a tortoise introduced into the archiepiscopal garden at Lambeth, in the time of archbishop Laud, and as near as can be collected from its history, about the year 1633, which continued to live there till the year 1753, when it was supposed to have perished rather from accidental neglect on the part of the gardener, than from the mere effect of age. This tortoise has had the honour of being commemorated by Derham, and many other writers, and its shell is preserved in the library of the palace at Lambeth.

The general manners of the tortoise, in a state of domestication in this country, are very agreeably detailed by Mr. White, in his *History of Selbourn*. "A land tortoise," says Mr. White, "which has been kept thirty years in a little walled court, retires under ground about the middle of November, and comes forth again about the middle of April. When it first appears in the spring, it discovers very little inclination for food, but in the height of summer grows voracious; and then, as the summer declines, its appetite also declines; so that for the last weeks in autumn it hardly eats

at all. Milky plants, such as lettuces, dandelions, sow-thistles, &c. are its principal food.

"The tortoise is totally a diurnal animal, and never stirs after it becomes dark. The tortoise," adds Mr. White, "like other reptiles, has an arbitrary stomach, as well as lungs, and can refrain from eating, as well as breathing, for a great part of the year. I was much taken with its sagacity, in discerning those that do it kind offices; for as soon as the good old lady comes in sight who has waited on it for more than thirty years, it hobbles towards its benefactress with awkward alacrity; but remains inattentive to strangers. Thus, not only 'the ox knoweth his owner, and the ass his master's crib,' but the most abject and torpid of beings distinguishes the hand that feeds it, and is touched with the feelings of gratitude. This creature not only goes under the earth from the middle of November to the middle of April, but sleeps great part of the summer; for it goes to bed in the longest days at four in the afternoon, and often does not stir in the morning till late. Besides, it retires to rest for every shower, and does not move at all in wet days. When one reflects on the state of this strange being, it is a matter of wonder that Providence should bestow such a seeming waste of longevity on a reptile that appears to relish it so little as to squander away more than two-thirds of its existence in a joyless stupor, and be lost to all sensation for months together in the profoundest of all slumbers! Though he loves warm weather, he avoids the hot sun; because his thick shell, when once heated, would, as the poet says of solid armour, 'scald with safety.' He therefore spends the more sultry hours under the umbrella of a large cabbage leaf, or amid the waving forests of an asparagus bed. But as he avoids heat in the summer, so in the decline of the year he improves the faint autumnal beams, by getting within the reflection of a fruit-tree wall; and though he has never read that planets inclining to the horizon receive a greater share of warmth, he inclines his shell by tilting it against the wall, to collect and admit every feeble ray."

The tortoise is said to be more tenacious of life than any other of the amphibia; many experiments performed upon them by Redi, of a cruel nature, such as opening their shells, taking out the brain, cutting off the head, evince their tenaciousness of life, and that the vital principle is very slowly discharged from these animals. Shaw.

**CARINATA.** Tortoise with digitated feet, and gibbous shell, with the four first dorsal scutella carinated, and entire sternum: found in warm regions, but very little known.

**GEOMETRICA.** Shell ovated, with all the elevated scutella above plane, marked with yellow stria issuing from the centre in form of a star: or, according to others, this is the tortoise with ovate black shell, and elevated scutella radiated with yellow; the *T. tessellata* minor of Ray. The pieces of which the disk of the shell consists are very prominent, striated, or furrowed pretty distinctly with numerous lines on their sides, and terminated above by a yellowish, flat, square, or rather hexagonal roughened space or centre, from which proceed, in a radiated direction, several well-defined yellow streaks towards the edge; thus constituting a beautiful kind of geometrical appearance on the black ground colour on which they are disposed: the marginal pieces, which are commonly twenty-four, sometimes twenty-six, in number, are also streaked with yellow, but in a somewhat different style.

The native country of this beautiful tortoise is perhaps not truly ascertained; though the shell is more frequently seen in Europe than that of almost any other kind. It is said, however, to inhabit Asia and Africa, and even to be found in America. According to Mr. Thunberg it is particularly common in shrubby places about the Cape of Good Hope. It is said to lay about twelve or fifteen eggs at a time.

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time. The count de Cépède supposes this species to be the Terrapin of Dampier, which that navigator represents as very beautifully variegated, and as delighting in moist and marshy places; adding, that its flesh is esteemed as a food, and that it is found in plenty on the coasts of the Pine islands, between the continent of America and Cuba: they are found in the forests, where they are easily taken: the hunters mark them on the shield, and let them wander about the woods; being sure to find them again at no great distance, every one easily recognizing his own property, and afterwards carrying them to Cuba. Shaw.

**PUSILLA;** Little Tortoise. With sub-digitated feet, and hemispheric shell, with convex, trapezoidal scutella, striated on the margin, and punctated on the disk. This is the African land tortoise of Edwards, and thus described by him from a specimen obtained from West Barbary. "The iris of the eye is of a reddish hazel colour; the lips hard, like the bill of a bird; the head covered with scales of a yellowish colour; the neck, hind legs, and tail, covered with a flexible skin of a dirty flesh-colour; the fore-legs covered with yellow scales on their outsides, which are partly exposed when the legs are drawn in; the shell round, and pretty much rising on its upper side, and flat beneath; the pieces or compartments are of a yellowish colour, clouded and spotted with large and small irregular dusky or blackish spots, and are also furrowed or creased, the creases lessening, one within the other, till they reach the top or middle part of each: the tail is thick, scaly, and about an inch in length; and the vent is situated within the tail itself near the base: there are five claws on the fore-feet, and four on the hind, all strong, black, rather bowed, and sharp-pointed." This species is found at the Cape of Good Hope, and much resembles the *T. græca*.

**INDICA.** Tortoise with brown shell, reflected above the neck, and marked with a tubercle on the three upper scutella. This is the great Indian tortoise, first described by Perrault in the "History of Animals," published by the Royal Academy of France; and confounded by M. Cépède with the *T. græca*. It is found in India, on the coast of Coromandel, &c. Of this there are two varieties, one brought from the Cape of Good Hope, and another from the Southern islands.

**SULCATA.** Tortoise with a tail, digitated feet, gibbose shell, and scutella lined and circumscribed with a furrow; or tortoise with brown ovate shell, with furrowed scutella yellow on each side. This is one of the larger species of land tortoise, being about a foot or more in length from the nose to the tip of the tail. The shell is very convex, and has the general habit of the *græca* and *geometrica* as to shape. This species is said to be a native of the West Indies, and perhaps may be the "Hicatee" of Brown, described in his History of Jamaica. Dr. Shaw suggests that this species may be the same with *T. tabulata*.

**PLANARIA.** Tortoise with digitated feet, and shell oval, convex, and smooth. Found at Surinam.

**AMERICANA TERRESTRIS.** Tortoise with oval, gibbose shell; scutella yellow in the middle of the disk; the margin marked with shining, black, furrowed, lateral polygons. This is conjectured by Gmelin to be the Jaboti of the Brazilians, and the cagado of the Portuguese. Found in South America.

**TABULATA.** Tortoise with oblong, gibbose, brown shell, with the scutella of the disk rectangular and furrowed; with yellowish centres. This was first described and figured in Seba's "Thesaurus," and there said to be a native of Brazil, though it is believed to be rather an African species. The general length of the shell is about

five or six inches: suspected to be the same species with *T. fulcata*, supra. Shaw.

**MARGINATA.** Tortoise with blackish-brown, oblong, gibbose shell, variegated with yellow, widened and depressed on the hind part. The true native country of this species is not very distinctly known. Mr. Schœpf inclines to think that it is an American species. Cépède has confounded it with the *T. græca*. Shaw.

**RADIATA.** Tortoise with ovate black shell, and flattish scutella radiated with yellow. This is the great chequered tortoise-shell of Grew's Mus. Reg. It has been concluded by some persons, from a general resemblance in the pattern of the shell, and a similarity in colours, that this is the same species with *T. geometrica*, or a variety of it. But Dr. Shaw has pointed out a variety of differences between them and such as warrant our stating that the two shells are perfectly distinct. Grew, who has described this species, says that its native country is Madagascar; but Dr. Shaw suggests that it is also a native of Jamaica, and that in characters and size it agrees with the "Hicatee" tortoise mentioned in Brown's Zoology. Shaw.

**RUGOSA.** Tortoise wrinkled, with black wrinkled shell, mottled and variegated with yellow; with the middle dorsal pieces subpanduriform or fiddle-shaped. In the Leverian museum there is a variety, or perhaps a sexual difference of this species.

**ELEGANS.** Tortoise with orbicular, convex, yellow shell, with transverse, oval, brown spots. Seba has described it under the name of the *T. terrestris* Ceilonica elegans minor. Shaw.

**AREOLATA.** Tortoise with moderately convex shell, with subquadrangular, elevated, deeply furrowed scutella, and depressed rough areolæ. This is described by Seba under the appellation of *T. terrestris* Brasilensis.

**SERRATA.** Tortoise with depressed yellowish shell, minutely freckled with dusky specks; all the scutella of the disk carinated, and the hinder margin of the shell serrated. This is supposed by Dr. Shaw to be the *T. spengleri* of Gmelin's Linnean System.

**TRICARINATA.** Tortoise with oval, slightly convex, shell, with entire margin, and all the scutella of the disk carinated. This species agrees, in shape and other particulars, with Linnæus's description of his *T. orbicularis*. Shaw.

**SCRIPTA.** Tortoise with orbicular depressed shell, with all the scutella marked by variously-formed characters, and the marginal pieces spotted beneath. This is the *T. scabra* of Thunberg. Its native place is not ascertained. Shaw.

**GALEATA.** Tortoise with depressed oval shell, with the three middle scutella sharply carinated, and twenty-four marginal pieces. The native place of this species is not known; but it was brought to Mr. Retzius from India, and lived two years kept in fresh water: it subsisted on bread, &c. and sometimes on flies. From the beginning of October to the middle of May it remained without food, scarcely elevating its head above the water. It delighted in sunshine, and endeavoured to climb up the sides of the vessel occasionally, in order to enjoy its influence. It is doubtful, whether this be the *T. scabra* of Linnæus. It is called *galeata* by Retzius, from the armed or cataphracted covering of the head. Shaw.

**GRANULATA;** Chagrin Tortoise. With orbicular, flat-tish, granulated shell, with cartilaginous border. This species seems to be allied to the *T. ferox*, having the shield furnished with a cartilaginous and flexible border. It is described by M. Cépède, and was brought from India by M. Sonnerat. Shaw.

Dr. Shaw, among the sea-tortoises or turtles, has described the

the turtle with green variegated shell, so named by the count de Cépède. These turtles are said to be found in great numbers in the Southern ocean, and about Cape Blanco, in New Spain. They also occur in the gulf of Mexico, and many of the large American rivers, both above and below the line; but they have never been discovered in the seas of the Old Continent. The flesh is said to be very delicate; and is even preferred in some places to that of the common turtle. M. Bomare is said by Cépède to have first described this species.

The "trunk turtle" is mentioned by Catesby, who says, without ever having seen it, from the report of others, that these turtles grow to a very large size, of a narrow form, but very deep, the upper shell being more convex than in other kinds of turtle. Their flesh is rank, but affords a large quantity of oil, which constitutes their value.

The "rhinoceros turtle," or *la tortue nasicornie*, has not been accurately described. Count de Cépède says, that it is a native of the American seas, and bears a general resemblance to the common or green turtle; but is distinguished by having a large soft tubercle on the tip of the snout, in which are situated the nostrils. It is eaten in the same manner as the green turtle, and is chiefly found in the equatorial regions. Shaw's General Zoology, vol. iii. pt. 1.

TESTUDO *Vesiformis Quadrabilis*, an hemispherical vault, or ceiling of a church, &c. in which four windows are so contrived, as that the rest of the vault is quadrable, or may be squared.

The determination of these windows was a problem proposed to the great mathematicians of Europe, particularly the cultivators of the new calculus differentialis, in the Acta Eruditorum Lipsiæ, by sig. Viviani, under the fictitious name of A. D. Piollesi pusillo-geometra, which was the anagram of postremo Galilæi discipulo.

It was solved by several persons, particularly M. Leibnitz, the very day he saw it: and he gave it in the Leipzig Acts in a variety of ways; as also did M. Bernoulli, the marquis de l'Hospital, Dr. Wallis, and Dr. Gregory.

TESTWOOD, in *Biography*, a singing man in the choir of Windfor, was burnt for his intemperate zeal in the cause of Protestantism, 1544, when Marbeck was likewise condemned, but afterwards pardoned.

TESZERSKEY, in *Geography*, a town of Croatia; 6 miles S.W. of Novi.

TET, a river of France, which rises in the Pyrenées, a little above Mont Louis, and runs into the Mediterranean, 7 miles E. of Perpignan.

TETANUS, in *Medicine*, a disease consisting in a spasmodic contraction of several of the muscles of voluntary motion, and more particularly of those which shut the lower jaw: and this being a constant and prominent symptom, the affection is commonly known by the name of *locked jaw*. The spasm of the muscles is of the *tonic* kind; or that in which the excellent contraction continues for a considerable time, without any interval of complete relaxation: in which respect it is opposed to *clonic* spasms, or convulsions, where the contractions and relaxations alternate in rapid succession. (See CONVULSION and SPASM.) The powers of sensation and of intellect remain unimpaired in tetanus; in which respect also it is contrasted with epilepsy.

Tetanus admits of many varieties and modifications, on which the older nosologists had founded different species of the disease. A rigidity of the muscles of the lower jaw was denominated *trismus*. When the muscles of the back were chiefly affected, the disease was termed *opisthotonos*: when those of the fore-part of the trunk, with the flexors of the

extremities, were the seat of spasm, it was called *emprosthotonos*. Sometimes, though very rarely, the spasms are confined to one side of the body only, bending it strongly to that side; a form of the disease which has been named by Sauvages *tetanus lateralis*, and by later writers, the *pleurosthotonos*, or *pleurotonos*. It was only when the spasm was almost universal, that it was considered as entitled to the appellation of *tetanus*. Of late years, however, these names have very properly been considered as expressing only varieties of one and the same affection, differing merely in severity, but arising from the same causes, and requiring the same mode of treatment. These various forms of spasm often follow one another in succession in the same case, and mark the progress of the disease through its different stages. Thus the trismus, or locked jaw, is only a part or prelude of opisthotonos and tetanus; and though it may prove fatal at this early period, the imperfect form in which the symptoms of a disease, which has been thus arrested in its course, may appear, is by no means sufficient to establish a generic difference in the disease itself. There appears, however, to be some foundation for a division of cases, according to their duration, into the acute and the protracted: the former being very little under the controul of medicine, and in almost every instance fatal; the latter being milder in its character, and often yielding, if proper means are employed for its subjugation.

Another ground of distinction among the different cases of this formidable disorder, is derived from the nature of the causes from which they have originated. The most usual causes are certain mechanical injuries to the body, more especially such as are attended with a puncture or laceration of a nerve: on other occasions, it may be the effect of the sudden application of cold, when the body has been previously overheated: and, in a few instances, it has appeared to arise spontaneously; that is, when it could not be traced to any external exciting cause whatever. Tetanus arising from wounds is, in general, slower in its progress than that which proceeds from cold; but is attended with more danger to life.

On some occasions the disease comes on suddenly, and with great violence; but more commonly the attack is gradual. It is often eight or ten days, and sometimes much longer, after the infliction of a wound, before the first symptoms of tetanus make their appearance: and this frequently happens when the effects of the injury on the part itself appear to have subsided; when the wound has healed, and no pain or uneasiness has remained. Those cases in which the disease is more slow in its approach, afford the best opportunity of tracing the natural succession of symptoms: and the first uneasy sensation which is then observed, is that of a slight stiffness in the back part of the neck and about the shoulders, which, gradually increasing, impede the rotatory motions of the head, and also its flexion forwards: so that the patient cannot look downwards, or to either side, without turning his whole body. This uneasy feeling, being chiefly felt on motion, very much resembles what occurs from rheumatism, but it is accompanied with a sense of general lassitude and debility. The rigidity now extends from the back of the neck to the muscles of the jaw, and of the root of the tongue, so that both mastication and swallowing become difficult and painful; and at length impossible. The attempt at deglutition is attended with convulsive efforts; especially when liquids are endeavoured to be swallowed. So great is the distress which accompanies these convulsions, that the patient becomes very reluctant to renew the trials, and refuses all nourishment; and it sometimes inspires him with even a dread of the sight of water.

As the disease advances, another set of symptoms appears, bringing

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bringing with them a considerable increase to the sufferings of the patient. A sudden and violent pain is felt shooting from the lower extremity of the sternum to the spine, in the situation of the diaphragm. These spasms recur from time to time, at short intervals; and at each recurrence, give the signal for an immediate aggravation of all the other spasms. The muscles of the neck and jaw are immediately called into violent action; the head is pulled strongly backwards; and the jaw becomes firmly clenched. These periodical accessions of spasm become more severe, and their effects more durable; so that the head continues to be in a state of retraction, and the jaw is permanently closed, the teeth being so firmly set together, as not to admit of the smallest opening. Such constitutes what may be regarded as the first stage of the disease; which sometimes takes up three or four days. At other times the disease establishes itself, with its whole train of dreadful symptoms, in a few hours; in which case the danger is imminent; as death generally takes place in from twenty-four to forty-eight hours, and the patient very rarely passes over the third day.

The continuance of the disease, if the patient survive the immediate attack, is marked by the increasing spasm of the diaphragm, which now returns every ten or fifteen minutes, and is instantly succeeded by a stronger retraction of the head, and rigidity of the muscles extending down the back, along the spine, and affecting even those of the lower extremities. Their contractions increasing in force, the body is frequently raised in the form of a bow, resting upon the head and feet alone: a state which is more particularly denominated *opisthotonos*. The countenance, as is observed by Dr. Chalmers, is pale and contracted; the mastoid, coracohyoid, and sterno-hyoid muscles, together with the others concerned in deglutition, and the deltoid and pectoral muscles, are most violently contracted, so that the shoulders are strongly raised forwards, and the arms are stretched out, or drawn across the body; but the wrists and fingers seem not to be affected. In a few seconds, a remission takes place; the shoulders and arms recline, and the inferior extremities relax; yet not so entirely, but that generally such a degree of rigidity continues, as to prevent their being bent, even when this is attempted by another person. The muscles on the sides and fore part of the neck continue still contracted, although not so strongly; but their action is overcome by the number and strength of the posterior ones; so that the contraction of the head constantly remains. The patient breathes quick for some minutes, as if he had been excessively exercised, and the pulse is small, fluttering, and irregular, but both become more calm and slow. The face is sometimes pale in the intervals, but oftener flushed; and the whole countenance expresses strong appearances of the most melancholy distress; as well on account of the terror the patient feels at the approaching paroxysm, as from the torture he has suffered from the last, of which the painful contractions he still feels perpetually remind him. He, for the most part, desires to lie still as much as possible, and to avoid all attempts at drinking, speaking, or any kind of motion; all of which are apt to occasion a return of the spasm in all its horrors. Some, indeed, are solicitous to try a change of position, in hopes of obtaining one of greater ease; but the act of turning the patient never fails to bring on an attack of the convulsion, by which the head is drawn back to the spine; and it is at length found, that the best means of avoiding this is for him to lie perfectly still on the back.

It may, in general, be observed, that the extensor muscles are affected with spasm before the flexors. In the lower extremities, indeed, both the flexor and extensor muscles are commonly at the same time affected, and keep the limbs

rigidly extended. The flexors of the head, and the muscles that pull down the lower jaw, become affected in the progress of the disease, together with the abdominal muscles; so that the belly is strongly retracted, and feels hard, like a piece of board. The spasm of these and the other flexor muscles, becoming so powerful as to balance the action of the extensors, is a circumstance that marks the advance of the disease, and may be regarded as constituting the commencement of a third stage. In this situation the body and limbs are perfectly straight and rigid, and incapable of being moved in any way; and it is to this condition that the term *tetanus* has been more especially applied. It is a state of the most exquisite suffering: the patient is on the rack from the continual recurrence of the spasm, which has scarcely any remission. The recti muscles of the abdomen often contract unequally, producing the appearance of hard balls in particular parts. The whole belly is drawn inwards, and does not yield in the least to the descent of the diaphragm in inspiration. Although the lower extremities are always rigid at this period, yet their action is so violent during the height of the paroxysms, that were it not for the standers-by, the patient would be projected feet foremost off the bed; or would, at other times, be pushed upwards with such an impetus, as to strike the head with great force against whatever might happen to be in the way. Occasionally, the flexor muscles acquire the preponderance over the extensors, and the trunk of the body is bent forwards, the chin being fixed to the breast. This is what has been called *emprostotonos*, and occurs only in the most violent, and of course the least frequent form of the disease. It would appear from some cases reported by Sauvages, that these opposite states are disposed to alternate with one another.

In extreme cases, there are hardly any of the voluntary muscles that remain in their natural state. The face and eyes are distorted; the tongue is suddenly darted out between the teeth, and often miserably lacerated from their closing at the same moment. Even the small muscles of the ear partake of the spasmodic action, which so universally prevails in the system. While the tongue is thrust out, the muscular flesh, which is situated between the arch of the lower jaw, and the upper part of the trachea, is drawn upwards within the throat. The countenance is much contracted; a general sweat breaks out; the eyes are watery and languid; and a pale or bloody froth bubbles out from between the lips. Tetanus, in these violent forms, is, perhaps, the most painful disease that can affect the human frame. So exquisite a degree of pain would scarcely be compatible with life, were it not occasionally assuaged by the short and imperfect remissions of spasm which occur. A more continued and severe spasm, or a general convulsion, generally finishes the tragedy, and releases the unhappy victim from all his misery: or, if already too exhausted by the severity of pain to admit of this mode of termination, delirium often ensues, protects the patient by a happy insensibility to further suffering, and smooths the avenue to death, which is then preceded by a general relaxation of the spasms.

Such are the symptoms which peculiarly belong to tetanus: and it is, perhaps, the most remarkable circumstance attending the disease, that hardly any function is primarily affected, except that of muscular action. The senses and appetites are perfect and entire; the intellectual functions are undisturbed; and the natural functions proceed in their usual course. Fever is neither an essential nor a common attendant on the disease. In the first stage, when the spasm is confined to a few muscles, the pulse is not affected: it becomes accelerated only when the spasmodic actions are  
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general, and this merely in consequence, as it would appear, of the mechanical effect produced on the blood-vessels by the contractions of the muscles, which will hurry on the circulation, and throw the blood upon the heart in larger quantity than usual, rendering the pulse contracted, frequent, and irregular. The respiration is hurried from the same cause, and the temperature of the body, as might be expected, is increased in the same proportion. That these symptoms are not the effect of fever, appears from the state of the blood, which is stated to be of a looser texture than natural, and never exhibits the buffy coat, as in inflammatory diseases. This circumstance is particularly noticed by Dr. Clephane, and also by Dr. Chalmers; and the remark has often been verified by subsequent observers. On some occasions, indeed, when the disorder is very violent, the arterial actions are increased, and a febrile state prevails; and this appears to take place more frequently when the disease has originated from cold, than when it has been excited by wounds. The skin is at first natural, but, as the disease advances, is covered with a cold sweat. The tongue is always moist. Vomiting sometimes takes place early in the complaint, but it commonly subsides in the progress of it: it is even usual for the appetite of hunger to remain through the whole course of the disease; and what food can be got down appears to be sufficiently well digested. Some local effects seem to be attributable to the contractions of the abdominal muscles. The sphincter of the bladder is occasionally affected with spasm, so as to impede the discharge of urine, which is voided with pain and difficulty: at other times, its secretion is suppressed. When it can be observed, it is stated as being high-coloured, and somewhat turbid. The bowels are found to be, in every instance, obstinately costive, a state which may partly be accounted for by the effect of opiates, which are so generally administered for the cure: but which, independently of this cause, appears to be inherent in the disease itself. The bowels require the most drastic purgatives; and there is a great sense of uneasiness about the precordia. In the latter stages of this disorder, indeed, when the powers of life begin to decline from the vast expenditure of energy occasioned by the violent muscular actions, every function in the system partakes of the general disorder; the intellect gives way, and the patient sinks from exhaustion alone, if a general convulsion does not occur to hasten his end. It is mentioned by Dr. Cullen, that, in several cases, a milary eruption has appeared upon the skin; but he expresses a doubt whether this was a symptom of the disease, or the effect of a certain treatment of it. It has not been observed, he adds, to denote either safety or danger, or to have any effect in changing the course of the distemper.

From the more violent forms of the disease, hardly any instance of recovery has been known to take place. On the other hand, the mere protraction of the symptoms is an indication of the comparative mildness of the disease. Few patients fall a sacrifice after the ninth or tenth days, which period they never could have attained, unless the violence of the complaint had in a great measure subsided. In this milder form, however, it may be prolonged several weeks; and sometimes the spasmodic disposition remains, even for months, before health is completely restored. The pulse, in these cases, continues slow and hard, and the belly bound: but if blood be drawn, it does not exhibit any difference from its usual state. Under every circumstance of recovery, indeed, the convalescent labours long under general debility, and cannot, for months, raise himself from a supine or recumbent posture without assistance, nor without pain.

Occasional deviations from the course above described are met with in different cases; but they are not of sufficient

importance to lay the foundation of any distinct variety. The most singular of these anomalies is the one recorded by Dr. (now Sir Gilbert) Blane, of a case in which tetanus prevailed to a very considerable extent, without affecting the patient with the least degree of pain. The spasms were, in this instance, accompanied with a tingling sensation, which was even rather agreeable than distressing. The case, however, terminated fatally: but to the last, no pain was experienced. In two cases mentioned by the same author, the spasms affected only the side of the body in which the wound was situated.

The result of dissections of patients who have died of tetanus, has thrown no light whatever on the nature of this terrible affection. Sometimes there are found slight effusions within the cranium: but, in general, no morbid appearance whatever can be detected in the head. There appears to be always more or less of an inflammatory appearance in the villous coat about the œsophagus and stomach in the neighbourhood of the cardia. But those who are conversant with dissections, must be well aware that these appearances are common to a great number of diseases, and are uniformly met with in every case of rapid or violent death. Besides the redness and increased vascularity of these parts, M. Larey states that he found the pharynx and œsophagus much contracted, and covered with a viscid reddish mucus. Dr. McArthur found, in several cases, the intestines much inflamed; and in two of them a yellow waxy fluid, of a peculiar offensive smell, covering their internal surface: but whether the inflammation was primary, or only a consequence of the pressure of the abdominal muscles, which contract so violently in this disease, he is unable to decide. See *Medico-Chirurgical Transactions*, vol. vii. p. 475.

Tetanus is a disease much more prevalent in hot than in cold climates. It is comparatively a rare disease in this island; but even here, the effect of warmth in giving a predisposition to it is sufficiently observable. It is more common in the south than in the north of England, and is much more seldom met with in Scotland than in England. It is sensibly more frequent in warm than in cold seasons. In warm, and especially in tropical climates, it may be regarded as an endemic disease, appearing at all seasons, but especially during the prevalence of the greatest heats. Warmth operates by increasing the mobility of the system, while at the same time it tends to diminish the positive strength of the fibre. The sensibility to all impressions is greater in hot climates, while the power of resisting the causes of injury is lessened: hence the greater predisposition to spasmodic diseases in general. The natives of hot climates do not enjoy a greater exemption from tetanus than European settlers. Negro slaves are peculiarly liable to its attacks. It affects all ages, sexes, constitutions, and complexions; but, *ceteris paribus*, is more apt to seize upon those in whom the largest share of vital power has been bestowed upon the muscles of voluntary motion. Hence it attacks more readily the robust, and those who are accustomed to much bodily labour. Partly on this account, and partly from their being more exposed to the occasional causes of the disease, men are much more frequently the subjects of tetanus than women.

In the torrid zone, the most frequent exciting cause of tetanus is the application of cold when the body is heated. It is often induced by the alternate exposure to the scorching heat of the sun, and to the heavy showers which frequently occur in tropical regions, and produce great and sudden vicissitudes of temperature. Sleeping out of doors after a hot day, especially on damp ground, or in a situation where a stream of cool air is admitted to the body, is often followed by tetanus in hot climates. Dr. Chalmers relates that a young man chose to cut off his hair and shave his head on a warm

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warm day in March, and went to bed without a cap: but the weather changing and becoming cold in the night, he was seized with tetanus, and the next morning was found rigid with the disease. The imprudent use of the cold bath, or even a draught of cold water, when the body has been warm by exercise, has frequently brought on tetanus.

In temperate climates, on the other hand, the disease seldom arises from the application of cold; although there is one well-attested instance mentioned by Dr. Gregory in his lectures, of its occurring from this cause in Scotland: but it is more frequently the consequence of lacerated or punctured wounds, and is particularly incident to injuries of nerves, and of tendinous parts. It sometimes follows the amputation of a limb; and it would appear that wounds of the joints, particularly those of the hands or feet, are more peculiarly liable to produce tetanus. In warm countries, the slightest cut or bruise is in danger of being succeeded by this formidable malady. Hence few of those that are wounded in battle recover: and few survive any considerable operation. It has been supposed by many, that tetanus arose from the partial division of some nervous fibres, in consequence of which the undivided filaments were unequally and violently stretched: a state which would be remedied by their complete division. Experience, however, the stubborn enemy to so many hypotheses, has by no means proved favourable to this opinion. It has also been stated to be more frequently the result of wounds, which remain in a state of great irritability, without proceeding to suppuration; it does not, however, appear that this position is supported on any extensive observation. It very often happens, indeed, that tetanus shews itself when the wound was almost healed, and the dressings have been laid aside.

In the late campaigns of our armies in the peninsula of Spain and Portugal, according to the report of sir James Macgrigor, tetanus occurred in every description, and in every stage of wounds, from the slightest to the most formidable, from the healthy and the sloughing, from the incised and lacerated, from the most simple and most complicated. It occurred at uncertain periods; but it was remarked, that if it did not commence before twenty-two days from the date of the wound, the patient was safe. It terminated in the second, third, and fourth days, and even as late as the seventeenth and twentieth days, though usually it was not protracted beyond the eighth. The most rapidly fatal case that has ever been recorded, is one that we have on the authority of the late professor Robison of Edinburgh. It occurred in a negro, who was a waiter at a tavern, and who happened to scratch his thumb with the broken edge of a china plate, and who died of tetanus a quarter of an hour after this apparently slight accident.

As the acute form of traumatic tetanus, observes Dr. Dickson, is so uniformly fatal, it is of the greatest consequence to attend to whatever may assist in detecting the disease early, or in warding it off. Richerand states, that in wounds threatening convulsions and tetanus, a persevering extension of the limbs during sleep often manifests itself before any affection of the lower jaw; and we should naturally pay more attention to any admonition of this kind in punctured or extensive lacerated wounds, particularly of tendinous or ligamentous parts, especially in injuries of the feet, hands, knee-joint, back, &c. in which the disease most frequently supervenes. Some prelusive indications of danger may often be derived from the increase of pain, irritation, and restlessness, nervous twitchings, pain and difficulty in deglutition, or in turning the head; spasms, or partial rigidity of some of the voluntary muscles; pain at the scrobiculus cordis; a suppressed or vitiated state of the dis-

charge, &c. which mark the slower approaches of the disease. M. Larrey adduces several instances of tetanus, in which the wound was either dry, or afforded only a scanty ferrous exudation, and where the symptoms were relieved on suppuration being re-established; and Dr. Reid, in the Edinburgh Medical and Surgical Journal for July 1815, remarks, that on removing the dressing, instead of healthy pus, the surface of the wound was covered with a darkish unhealthy looking matter, which he had in two former instances noticed as the forerunner of tetanus. A torpor of the intestines has generally been observed to precede as well as to accompany the disease. Mr. Abernethy observes, that in four cases where he inquired into the state of the bowels, the evacuations were not like feces; and he proposes as a question in investigating the cause, what is the state of the bowels between the infliction of the injury and the appearance of this dreadful malady? Dr. Parry has adduced the velocity of the circulation as an useful criterion of the danger of the disease; and observes, that if the pulse be not above 100 or 110, by the fourth or fifth day the patient almost always recovers; but if it be quickened early, that it proves fatal; and yet there are a few instances of recovery where the pulse has risen to 120 on the first day. M. Larrey remarks, that when the perspiration, which so often attends the disease, is symptomatic, it begins upon the head and extremities; and when it is critical, it occurs over the chest and abdomen: but in many cases, perspiration flows very freely without bringing relief.

We have already stated, that in some instances the source of irritation producing the disease is not obvious. Such cases of spontaneous tetanus are very rare. Dr. Willan, in his Reports, p. 289, mentions having met with an instance in a female, 32 years of age, where there had not been any previous accident or local injury whatever; and where the only circumstance, which was likely to have contributed to its production, was severe distress of mind, occurring in a frame previously debilitated.

When we reflect upon the obscurity which involves both the *ratio symptomatum* and the proximate cause of tetanic affections, we need not wonder that the practice in these disorders should still be entirely empirical. The indication of cure which is generally applicable in all diseases, namely, the removal of the exciting causes, has but little place in a morbid condition, which is the consequence of causes that in general have ceased to act, or which it is not in our power either to remove or controul. In those cases where we could suppose local irritation to be still operating, the most effectual method of counteracting its effects on the system, would obviously be to intercept all communication between the seat of the irritation and the sensorium. If, however, the disease has already established itself, and the severe symptoms have come on, it does not appear that this would succeed in arresting the course of the disorder. Experience has but too fully shewn, that the amputation of the limb from the injury of which the tetanus had arisen, will very seldom procure even a mitigation of the symptoms, if performed after a certain period from their first appearance. This plan was fully tried in our army at Toulouze, and totally failed. In some instances, however, it is said that a favourable change has ensued, and that patients have even recovered by the sacrifice of the wounded limb: and it has been remarked, that the spasms relaxed immediately on the division of the soft parts by the knife, and before the saw was applied to the bone, in order to complete the operation. It is, therefore, highly probable, that the free division of the parts above the wound, or still more certainly the amputation of the limb, would, at a certain stage of the affection,

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secure the patient from the approach of tetanus. But the difficulty is here to estimate the probability of the patient's having the disease, as nothing short of the certainty of its being at hand, could well justify the operation.

As it is matter of experience that an early and highly irritable and painful condition of the wound has a tendency to excite tetanus, as well as a state in which the discharge is of a peculiar unhealthy character, or is suppressed altogether, our immediate objects should be to allay as much as possible the local irritation, and to re-establish a healthy secretion of pus. Mechanical causes of irritation should as much as possible be obviated, by early attention to remove splinters of bone, balls, or other foreign bodies, that may be lodged in the wound. Poultices and soothing applications will answer the double purpose of quieting local inflammation, and bringing on healthy suppuration. The irritability of the surface may sometimes be most effectually destroyed by lunar caustic, after which, an emollient poultice may be applied. An opposite plan of treatment has been recommended by Dr. Rush, namely, that of exciting considerable inflammation in the wounded part, by epithems of turpentine, and other highly stimulating applications; which, though it may in certain cases have succeeded in preventing tetanus, does not appear to be generally applicable, and seems accordingly to have been abandoned. On the contrary, it has of late been the universal practice in the navy, to add tincture of opium to the dressings applied to wounds, with a view of preventing tetanus. With the intention of re-exciting suppuration where there is no discharge, M. Larrey recommends the application of blisters as near as possible to the wound, and adduces instances of success from this mode of treatment.

But the cure of tetanus, when once it has commenced, is to be fought for more by the use of general, than of topical remedies. The seat of the disorder has been transferred to the brain and nervous system, and our efforts must be directed to allay their inordinate actions. The plan from which theory would lead us to expect most success, is that of exciting some new action in these organs, by which their energies would be directed into some different channel, and the existing morbid action would be suspended and superseded. The remedies which exert the most powerful immediate effects in the nervous system, are accordingly found to be the most efficacious in the cure of tetanus. Opium, wine, and other highly diffusible stimuli, digitalis and other narcotics, the sudden affusion of cold water, bleeding, purging, impregnating the system with mercury, the exhibition of arsenic, of oil of turpentine, of alkalies, and of ipecacuanha, have respectively been resorted to, and with very various, and in general but limited success. The same methods from which cures have been obtained in the milder cases, generally fail to make the least impression on the disease in its severer forms. We learn from the valuable report of sir James Macgrigor, already alluded to, that there were very few, out of several hundred cases that occurred in the British armies during the late campaigns on the Peninsula, where this disease had made any progress, in which it terminated successfully, or in which remedies, however varied, seemed to have any beneficial influence.

Opium is the remedy on which reliance has most generally been placed in combating this formidable disease; and there is no doubt that in mild cases it is competent to its complete solution. But for this purpose, it is absolutely necessary that its use be begun from the earliest appearance of the symptoms; that it be given in very large doses; and that the doses be repeated at short intervals: so that the system be kept constantly under the influence of the remedy.

It is, indeed, astonishing how the system, when possessed by a strong disposition to spasm, will resist the operation of this and other remedies, which in its ordinary state would have been more than sufficient to overpower and destroy it. Patients labouring under tetanus will bear with impunity quantities of opium, that at any other time would have been certainly fatal. Instances are upon record of five, ten, and even twenty grains, being taken every two or three hours for many days, without its producing any extraordinary narcotic effects upon the sensorium. It is always, however, advisable to begin with comparatively moderate doses, such as forty or sixty drops of tincture of opium, which may be repeated at intervals of three or four hours, and increased at each repetition, till some sensible effect is produced on the spasms. It seems requisite to augment the dose rapidly, as the disease presses upon us every hour, and no time is to be lost in resisting its advances, while there is yet a chance of controuling its fury. The circumstance of the closing of the jaw, and the difficulty of deglutition, the increase of which may soon render it hardly possible to introduce medicines into the stomach, is an additional motive urging us to push our remedies before those obstacles arise. Glysters are our only resource, when it is impossible to overcome the spasm of the fauces. Opium has also been applied externally and topically to the jaws; and relief has sometimes been obtained from an opiate plaster on the masseter muscles, or behind the ears; but these are comparatively very trifling in their efficacy, and applicable only to the slightest cases, or to those in which convalescents are still affected with a recurrence of one or two local symptoms.

It is of the greatest importance in all cases of tetanus, and more especially where opium is given, to excite a proper action of the bowels, so as to allow of no stagnation of their contents. The testimony of the army physicians, as appears from the report of sir James Macgrigor, is highly in favour of a rigid perseverance in the use of purgatives, given in doses to produce a full effect daily. Dr. Forbes states, that a solution of sulphate of magnesia, in infusion of fenna, was found to answer better than any other purgative, and it was daily given in a sufficient quantity to procure a copious evacuation, which was always dark-coloured, and highly offensive: and to this practice he chiefly attributes, in one severe case, the removal of the disease. The infrequency of locked jaw in the West Indies, in the public service, of late years, is chiefly ascribed by Dr. Dickson, to the greater freedom with which purgatives have been employed, particularly since the publication of Dr. Hamilton's work on the operation of this class of remedies; an opinion which is corroborated by the testimony of various authors, as to the state of obstinate costiveness which prevails in this disease, and the offensive nature of the contents of the intestines.

For the introduction of the stimulant and tonic plan of treatment, we are chiefly indebted to Dr. Rush, who was led to adopt it from some theoretical views he entertained on the nature of tetanus, which he conceived to be essentially a disease of debility. There can be no doubt that in many cases the exhibition of wine or spirits has been attended with very good effects. Dr. Hossack, in vol. iii. of the American Medical Repository, relates several cases which were cured by large quantities of wine.

A free allowance of wine and porter after gun-shot wounds has appeared also, according to the statement of Dr. M'Arthur, to have contributed to the very small number of cases of tetanus which occurred under his care in the hospital at Barbadoes, during nearly six years of the most active period of the war. Of the numerous cases of gun-shot wounds received into the hospital, and of operations performed, during the

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whole of that period, only two instances of tetanus occurred. Bark has been given in conjunction with wine and opium; and the muriated tincture of iron has also been used with apparent advantage. The success of the tonic plan of treatment rests also on the testimonies of Dr. Wright of Jamaica, Dr. Cochrane of Nevis, and several other West Indian practitioners; and also on that of Dr. Currie of Liverpool.

The presence of an inflammatory diathesis, which occasionally accompanies the spasmodic state, presents, however, a material obstacle to the employment of the above-mentioned remedies. So much is this the case, that many physicians have recommended the free use of the lancet, particularly in the early stages of tetanus. Dr. Dickson states it as his opinion, that in a full habit, where the wound is swelled, inflamed, and painful, venesection, with free purging, and such other means as are calculated to allay the general and local irritation, afford the fairest chance of averting the danger. (See the 7th volume of the Medico-Chirurgical Transactions, part 2.) In the 6th volume of the same work, a case is detailed by Mr. Earle, in which, though it terminated fatally, bleeding was beneficial, and lessened the patient's sufferings; and in the same volume, it is also mentioned with approbation by the medical officers in the Peninsula. Dr. M'Arthur considers that he used blood-letting with evident relief in one case, in the naval hospital at Barbadoes; that the spasms were ameliorated, the disease protracted, and the morbid appearances after death were less marked in consequence. M. Larrey also adduces some examples where it produced a good effect. Mr. Guthrie gives three cases which occurred in the hospitals of St. Andero, out of many which were recorded, where venesection was the principal remedy. In the first, in which tetanus from a wound in the hand was advancing with rapidity, the patient was bled *ad deliquium* several times with good effect, calomel and diaphoretics being given at the same time, and he recovered. In the second case, the patient was bled in the same manner, with an evident amendment of the symptoms; so much so, indeed, that he suffered but little from spasm, and could open his mouth very well, when he was seized with diarrhoea, which, in the debilitated state he was in, carried him off. In the third case, of a man of a sanguine temperament, and suffering from acute tetanus, venesection pushed to the utmost totally failed.

Digitalis has been tried in the Peninsula in several cases, occasionally with good effect, though it never appears to have effected a cure. Ether, camphor, musk, and other antispasmodics, as likewise the alkalies, were also tried, and found equally unsuccessful. Castor is strongly recommended by Arataeus, but is too feeble a remedy to have any decisive influence in so violent a disorder.

The affusion of cold water has in general been attended with great benefit. It is a practice particularly recommended by Dr. Wright, in the London Medical Observations, and is sanctioned by the concurring testimonies of Dr. Cochrane, in the Medical Commentaries, and of Dr. Currie, in his Medical Reports, &c. as well as by many other practitioners. A large pailful of cold water should be thrown upon the patient every two or three hours; he is to be immediately wiped dry, and laid in bed after each affusion, and an opiate draught administered. Some remission of the spasms will in this way be generally obtained; and many instances are upon record, of complete cures being effected by perseverance in this plan. Before the introduction of this practice, the warm bath was very commonly employed; the patient, after using it, being placed in bed, without being dried, between two blankets, with a view to bring out a sweat. It does not appear, however, that this plan was attended with any general or permanent advantage; and is certainly inferior in

efficacy to the cold affusion. The cold bath, says sir James Macgrigor, in acute tetanus, is worse than useless. The use of a hot bath impregnated with potash, and a few ounces of quick-lime, has been much recommended by Dr. Stutz of Suabia in traumatic tetanus. See Medical and Physical Journal, vol. iii.

The powerful relaxing effects of tobacco given in glyster in cases of hernia and enteritis, have suggested its employment in tetanus. Mr. Earle tried it in one very acute case, in which, although it afforded a temporary alleviation from spasm, so much agitation was produced by it, that it was not persevered in. He is, however, induced to recommend the trial of a suppository made of the extract of nicotiana, and passed up into the rectum. But, according to the report of sir James Macgrigor, tobacco glysters, tried in the advanced stage of the disease, seemed to have no effect. He represents, however, the tobacco fume as deserving of further trial. A remarkable case is recorded by Dr. Phillips, in the 6th volume of the Medico-Chirurgical Transactions, in which the jaw suddenly fell, upon the exhibition of an enema with oil of turpentine.

It has been supposed that mercury thrown quickly into the system, so as to excite salivation, would prove highly serviceable in relieving the spasms, and particularly those of the muscles of the jaw. This practice was first introduced by the practitioners in the West Indies, and in particular by Drs. D. and A. Monro, and appears to have succeeded in many cases. Dr. Rush conceives that its salutary effect is connected with its inducing in the system a state of inflammatory diathesis incompatible with the spasmodic action, which it would therefore supersede. Whatever benefit, however, may have been experienced from this plan in mild cases, it completely fails in the more severe of making any impression on the disease. Dr. Emery, Mr. Guthrie, and other medical officers attached to our army in the Peninsula, after the battle of Salamanca, tried inunction of the whole body three times a day, with strong mercurial ointment, in unlimited quantity, with no degree of success. Mr. Guthrie reports, that after the battle of Toulouze, a fatal case occurred in a man strongly under the influence of mercury, which he had used previous to the action for the cure of the itch. The combination of calomel with ipecacuanha, which has been much recommended, is equally inefficacious with the other remedies, in the acute and fully formed disease. In the mild tetanus, benefit has been derived from calomel: and its operation on the bowels is always useful, and singularly so in the mild disease distinguished by the spasms coming on slowly, and continuing of the same violence; instead of their sudden accession, and their continuing with increasing violence, as happens in the acute fully formed tetanus. In this, calomel cannot be depended upon, as the patient is carried off before the medicine can have any effect.

Several remedies were formerly in vogue, of which it is hardly necessary to give any account, as they have now lost all the credit they once enjoyed. It may be sufficient to mention the Barbadoes tar, alluded to by Dr. Cullen; the colchicum autumnale, or meadow saffron, recommended by Dufresnoy; blistering, electricity, unctuous applications, partial fomentations, &c. most of which appear either to be inert, or at best very weak auxiliaries to the remedies already described.

Of late years, tetanus has been much less frequent in the West Indies, when compared with former wars. This is attributed, apparently with great reason, by Dr. Dickson, to the improvements in the medical and surgical treatment of wounds; to greater cleanliness, and more perfect ventilation; and in general to superior comforts, diet, and accom-

modation; but particularly to the greater attention paid to the state of the bowels. See *Medico-Chirurgical Transactions*, vol. vii.

**TETARBOLION**, in *Ancient Coinage*, the quarter-obolus, which is the most minute coin yet found, being of  $2\frac{1}{4}$  grains, and its current worth a farthing and a half.

**TETARIUM**, in *Ancient Geography*, a town of Asia, situated in that part of Lycaonia, which Ptolemy comprehends in Galatia.

**TETARTEMORION**, among the *Ancients*, denotes the fourth part of the zodiac.

**TETARTO-CHRUSOS**, τεταρτηρο-χρυσος, in *Ancient Coinage*, a gold coin of Philip, Alexander, and Lyfimaachus, which was a quarter of the Philippus or χρυσος; it weighs 33 grains, and passed for 5 drachmæ of silver, 3s. 9d., now worth intrinsically 5s.

**TETAVI**, in *Geography*, a town of the principality of Georgia, in the province of Caket.

**TETBURY**, or **TEDBURY**, anciently *Teteberi*, a large and respectable market-town in the hundred of Longtree, and county of Gloucester, England, is situated 20 miles S. by E. from Gloucester, and 99 miles W. by N. from London. Its name evidently determines it to have been a military station. On the S.E. side, within the memory of many living, were traces of a strong camp, now completely destroyed, where arrows and javelin-heads have been found, with various English coins of high antiquity. Roman coins of the Lower Empire have likewise been met with in and near the town. Tetbury consists principally of four streets, crossing in the centre, and contains many good stone buildings. The governing officer is a bailiff, who is annually chosen. The population of the parish, including four hamlets, in the year 1811, was 2533, the number of houses 522. A weekly market is held on Wednesday, and four fairs annually. The wool-combing and wool-stapling branches are carried on here, but to no great extent. The clothing manufacture was formerly attempted, but the want of a continual supply of water prevented its being brought to perfection. Even for domestic uses, water has, till within a few years, been scarce; but in 1749, a well was sunk to the depth of 104 feet, since which time other wells have been opened, and the inconvenience in a great degree removed. The parish church consists of an ancient tower, and a modern body; the former is terminated by a spire, the latter is built in imitation of the pointed style, appearing externally as a single nave with cloisters, but within divided into aisles, by a very slight arcade and clustered columns, on the principle on which the roof of the theatre at Oxford was constructed. The old church, which was built soon after the Conquest, having become from length of time very ruinous, was taken down (excepting the tower and spire), and rebuilt at the expence of 5000*l.*; and opened for divine service in 1784. Two turnpike roads lead through the town in cross directions; one to London and Bath, the other to Gloucester and Southampton. A deep hollow, in the nature of a moat, at the west end, made the entrance into the town inconvenient, till the commissioners of the roads built a high bridge of four arches across it in 1775. Rudge's History of Gloucestershire, vol. i. 1803. Beauties of England and Wales, vol. v. Gloucestershire; by J. Britton and E. W. Brayley, 1803.

**TETCHA**, a small river of Russia, which runs into the Iset, near Dolmatov, in the province of Ekaterinburg.

**TE-TCHUEN**, a town of Corea; 60 miles E.N.E. of Han-teheou.

**TETE**, a fort belonging to the Portuguese, in the country of Mocaranga, on the Zambeze.

**TETE de Buch, La**, a town of France, in the department of the Gironde, situated on the S. side of a large bay, called "The Harbour of Arcachon," the entrance of which is dangerous on account of the sand-banks; 30 miles S.W. of Bourdeaux.

**TETEROA**, a harbour on the W. coast of the island of Ulitea.

**TETEROW**, a town of the duchy of Mecklenburg; 18 miles S.W. of Guströ.

**TETERSKOL**, a town of Russia, on the Podkamenskaja Tunguska. N. lat. 59° 54'. E. long 101° 14'.

**TETHALASSOMENOS**, a term used by the old medical writers, to express wine mixed with sea-water.

**TETHER**. See **TEDDER**.

**TETHERING**, the practice of confining animals to a certain range of feeding, by means of ropes, chains, or other contrivances.

**TETHIRONIUM**, in *Ancient Geography*, a town of Greece, in the Phocide; being one of those which Herodotus refers to the vicinity of the river Cephissus.

**TETHUROA**, in *Geography*, a small island in the South Pacific ocean, subject to Otaheite, composed of six or seven low islets near each other, not many feet above the level of the sea; abounding in cocoa-nut trees, but not in bread-fruit, which the inhabitants are not allowed to cultivate. The inhabitants are about 3000, chiefly employed in catching of fish, which they bring to Otaheite, and exchange for bread-fruit; 24 miles N.W. of Point Venus. S. lat. 17° 4'. W. long. 149° 30'.

**TETHYS**, in *Mythology, the daughter of Cœlum and Terra, and wife of Oceanus. Her chariot, which is represented as gliding over the surface of the waters, was a shell of an extraordinary figure, and whiter than ivory.*

**TETHYS**, in *Zoology*, a genus of the Mollusca order of Vermes, or worms; the characters of which are, that the body is free, somewhat oblong, fleshy, and having no peduncles; the mouth terminating in a cylindric prohoecis, under the lip; and two foramina on the left side of the neck. It has two species.

**LEPORIUS**. With a ciliated lip; found in the Mediterranean sea.

**FIMBRICA**. With a crenulated lip; found in the Adriatic sea.

**TETIMIXIRA**, in *Ichthyology*, the name of an American fish, more usually known by the name of the *pujiano*.

**TETIN**, in *Geography*, a town of Bohemia, in the circle of Beraun; 3 miles S. of Beraun.

**TETITLAN**, a town of Mexico, in the province of Xalisco; 18 miles S.E. of Compostello.

**TETIUS**, in *Ancient Geography*, a river of the isle of Cyprus, which ran from the N.W. to the S.E. and discharged itself into the sea, near the promontory of Dades, after having watered Citium.

**TETIUSCHI**, in *Geography*, a town of Russia, in the government of Kazan, on the Volga; 52 miles S. of Kazan.

**TETOBE**, a town of the state of Georgia; 5 miles W. of Tugeloo.

**TETRACERA**, in *Botany*, received that name from Linnæus, in allusion to the four horn-like points of the capsules of the original species, the word being compounded of τετρα, *four-fold*, and κέρα, *a horn*. The genus however has subsequently received an accession of several species with solitary capsules and styles, which invalidate the strict propriety of its name, and render its situation in the artificial system of Linnæus ambiguous.—Linn. Gen. 275. Schreb. 369. Willd. Sp. Pl. v. 2. 1240. Mart. Mill. Dict. v. 4. Juss. 339. Lamarek Illustr. t. 485. Gært. t. 69. (Delima; Linn. Gen.

## TETRACERA.

Gen. 271. Schreb. 359. Juss. 339. Lamarck Illustr. t. 475. Gært. t. 106. Rhinium; Schreb. 701. Tigarea; Aubl. Guian. 917. Juss. 339. Lamarck Illustr. t. 826. Euryandra; Forst. Gen. t. 41. Schreb. 367. Juss. 280. See EURYANDRA.)—Class and order, *Polyandria Tetragynia*, Linn. Willd. Rather *Icosandria Monogynia*; or *Pentagynia*, according to the principles laid down in Sm. *Introductio ad Bot.* ed. 3. 325. Nat. Ord. *Senticosæ*, Linn. *Rosuceæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five or six deep, rounded, unequal segments, permanent. *Cor.* Petals from three to five, roundish, concave, inserted into the calyx, and longer than its segments. *Stam.* Filaments numerous, inserted into the calyx, shorter than the petals; anthers of two round lobes. *Pist.* Germens superior, from one to three or four, ovate, quite distinct; styles vertical, awl-shaped; stigmas obtuse. *Peric.* Capsules from one to three or four, ovate, divaricated, each of one valve, bursting along the upper edge, of one cell. *Seeds* solitary, roundish, attached to the bottom of the capsule, and clothed with a jagged tunic from the base.

Eff. Ch. Calyx in five or six deep unequal segments. Petals four or five. Capsules bursting at their upper edge. Seeds solitary, tunicated.

Obs. The capsules resemble follicles, but the seed is attached to their base.

Section 1. *Flowers with a solitary germen and 1 style.*

1. *T. farmentosa*. Trailing Tetracera. "Vahl Symb. v. 3. 70." Willd. n. 1. (*Debma farmentosa*; Linn. Sp. Pl. 736. Burm. Ind. 122. t. 37. f. 1. Piripu; Rheede Hort. Malab. v. 7. 101. t. 54. *Frutex indicus farmentosus, foliis hispida rigidis, &c.*; Burm. Zeyl. 101.)—Leaves elliptic-oblong, ferrated, rough. Style solitary. Follicle ovate, polished, brittle.—Native of Ceylon.—The stem is shrubby, with trailing, round, leafy branches, rough with minute bristly hairs. *Leaves* alternate, stalked, very rough on the upper side with minute scales, furnished with one rib, and many straight, parallel, transverse, oblique veins, which latter are hairy beneath. *Panicles* terminal, compound, many-flowered, hairy. *Calyx* of the fruit reflexed, reddish, fringed. *Follicle* pointed, the size of a small pea, brown, highly polished, clothed with erect bristly hairs. *Seed* black, standing on a toothed cup-like tunic.

2. *T. tomentosa*. Downy Tetracera. Willd. n. 2. (*Tigarea dentata*; Aubl. Guian. 920. t. 351.)—Leaves elliptical, pointed, with tooth-like ferratures; smooth above; downy beneath. Flowers dioecious. Style solitary.—Native of woods in Cayenne, flowering in January, and ripening its seed in March. The trailing shrubby branched stem climbs to the tops of the highest trees, from whence its pendulous branches reach almost to the ground. The young shoots are downy. *Leaves* alternate, stalked, four or five inches long, and two or more in breadth; their upper surface smooth and green; the under silky and hoary. The flowers and fruit agree with the following.

3. *T. aspera*. Harsh Tetracera. Willd. n. 3. (*Tigarea aspera*; Aubl. Guian. 918. t. 350.)—Leaves roundish, somewhat undulated, rough. Flowers dioecious. Style solitary.—Frequent in the woods of Cayenne, bearing flowers and fruit in January. Aublet says it is sometimes so abundant as to render the forests impassable, from the entanglement of its stems and branches, which climb to the tops of trees, and hang from thence to the ground. Their roughness, like that of the leaves, renders them more troublesome and dangerous. The French call this shrub *Liane rouge*, or red climber, from the colour of its decoction, which the natives of the country consider as a remedy for venereal disorders. The leaves are alternate,

stalked, of a broad elliptical, or roundish, figure, obtuse, slightly wavy at the margin, rough on both sides with rigid, crooked, hoary hairs. Their ribs and veins like those of the first species. The largest leaves are three inches and a half long, and three broad. *Flowers* in axillary panicles, male on one plant, female on another. *Calyx* in four or five concave, pointed segments. *Petals* four or five, white. *Stamens* numerous, short. *Anthers* yellow, their two lobes separated by a furrow. *Pistil* abortive in the male flowers, as the *stamens* are without *anthers* in the female, whose *germen* is roundish, with one *style*, and a broad blunt *stigma*. *Capsule* solitary, reddish, rough to the touch, containing one seed. *Aublet*.

4. *T. nitida*. Polished Tetracera. "Vahl Symb. v. 3. 70." Willd. n. 8.—"Leaves lanceolate-oblong, rough, entire. Style solitary."—Supposed to be a native of Trinidad. *Willd.*

Willdenow has four more species in this section, of which his *T. Doliolecarpus*, *stricta*, and *Calinea*, will be found under our article *DOLIOLECARPUS*; and his *T. obovata* is our *MAPPIA*.

Section 2. *Flowers with three or four germen and styles.*

5. *T. Euryandra*. New-Caledonian Tetracera. "Vahl Symb. v. 3. 71." Willd. n. 9. (*Euryandra scandens*; Forst. Prod. 41.)—Leaves oblong, obtuse, smooth, entire. Styles three.—Native of New Caledonia. *Stem* shrubby, climbing. *Leaves* stalked, two inches or more in length; paler beneath.

6. *T. volubilis*. Serrated Rough Tetracera. Linn. Sp. Pl. 751. Hort. Cliff. 214. Willd. n. 10. (*Arbor americana convolvulacea*, Broad leaf, *i. e.* *platyphyllos barbadensis* dicta, *foliis ferratis*; Pluk. Phyt. t. 146. f. 1.)—Leaves obovate-oblong, ferrated, very harsh. Styles four. *Calyx* silky within.—Native of the West Indies. The branches are round, with a rough, dotted, membranous, deciduous bark. *Leaves* alternate, stalked, five or six inches long, and two and a half or three wide, obtuse, very rough, like a file, with minute scales, especially beneath; each lateral rib, at least in the upper half of the leaf, terminating in a sharp but shallow ferrature. *Panicles* terminal, compound, rough with starry hairs. *Calyx* harsh and hoary externally; brittle and silky within. *Capsules* unequal, ovate, tumid, beaked, brown, smooth and highly polished; rounded, not depressed or keeled, at the sides. *Seed* small, black, in a pale, finely lacinated, tunic.

7. *T. rotundifolia*. Round-leaved Tetracera.—Leaves roundish-elliptical, entire, very harsh on both sides. Styles four. *Calyx* smooth within.—Native of Guiana. We have received specimens of this new species from Mr. Rudge and Mr. Forster, under the name of *Tigarea aspera* of Aublet, our *Tetracera aspera*, see n. 3, which, unless that author has made several great mistakes, must be a very different plant. The present has always three or four styles, and as many capsules; and the leaves, though like Aublet's t. 350. in shape, are quite entire, not undulated. They are harsh on both sides, like a very fine file, as is the branch in a less degree. The panicles are terminal. The calyx has a short, inversely conical, tube, and is hoary externally, smooth and naked within. The stamens appear to be perfect in the same flower with the four pistils. Capsules three or four, oval, brown, smooth and shining; keeled and depressed at the sides, less tumid than the foregoing. Seed entirely enveloped in its jagged tunic.

8. *T. levis*. Smooth Tetracera. "Vahl Symb. v. 3. 71." Willd. n. 11.—"Leaves oblong, smooth, pointed, nearly entire. Flowers terminal. Capsules four."—Native of the East Indies. *Stem* shrubby. *Leaves* alternate, two or three inches

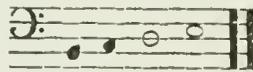
inches long, veiny, smooth on both sides; tapering at the base; ferrated with a few slight teeth towards the point. *Footstalks* very short. *Flower-stalks* solitary or in pairs, terminal, an inch long. *Flowers* somewhat racemose, one or two on each partial stalk. *Calyx* with six roundish segments. *Capsules* four, as long as the finger-nail, roundish, tumid, pointed, very smooth and polished. *Seed* small, black, polished, covered in its lower half with a whitish tunic, whose margin is toothed. *Vabl.*

9. *T. almifolia*. Alder-leaved Tetracera. Willd. n. 12. —“Leaves oblong, acute, nearly entire; roughish beneath. Panicle terminal.”—Native of Guinea. *Branches* woody, round, smooth. *Leaves* coriaceous, tapering at the base, rounded at the extremity, with somewhat of a point; mostly entire, but occasionally furnished with an obsolete tooth or two near the end; veiny; shining and smooth above. *Calyx* with four deep segments. *Petals* apparently five. *Filaments* a little dilated at the end, with an anther (or lobe) at each side. *Capsules* four. *Seed* black, entirely covered by its whitish tunic. *Panicle* simple. *Stalks* three-flowered. *Willd.*

Willdenow suspects the *Asta indica*, of Houttuyn's Dutch edition of the Vegetable System of Linnæus, v. 4, 40. t. 26. f. 1, may be another species of the genus before us. The same author is also inclined to refer Thunberg's WAHLBOMIA, see that article hereafter, to *Tetracera*.

**TETRACHORD, TETRACHORDON**, formed of τετρα, of τετρακις, four times, and χορδή, a chord, or string, in the *Ancient Music*, was a series of four sounds, of which the extremes, or first and last, constituted a fourth. These extremes were fixed and immutable; the two middle sounds were changeable according to the genera, and called *mobiles*. There were three genera or ways of tuning each tetrachord; the *diatonic*, *chromatic*, and *enharmonic*. The character of the diatonic was the tone; of the chromatic, the semitone; and of the enharmonic, the quarter-tone.

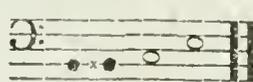
A tetrachord in the diatonic genus consisted of one major semitone and two tones.



In the chromatic genus, of two semitones and a minor third.



In the enharmonic genus, of a quarter tone, a semitone, and a major third.



The general system or scale of the Greeks consisted of tetrachords repeated, as the scale of Guido does of octaves. See *GREEK Music*.

The tetrachord of Mercury contained four strings or chords, in the proportion of twelve, nine, eight, and six; so as to give the fourth, fifth, and octave of the lowest chord. This is the opinion of Boethius, and after him of Zarlino. Vide Wallis's Append. Ptolem. Harm. p. 178.

**TETRACTIS**, in *Natural History*, a name given by Linkius, and other authors, to a kind of star-fish, composed only of four rays, the more common kinds having five.

**TETRACTYC ARITHMETIC**. See *ARITHMETIC*.

**TETRACTYS**, in the *Ancient Geometry*. The Pythagoric tetractys is a point, a line, a surface, and a solid.

**TETRADECARHOMBIS**, in *Natural History*, the name of a genus of fossils, of the class of the selenites.

The word is derived from the Greek τετρα, four, δεκα, ten, and ρόμβος, a rhomboidal figure, and expresses a rhomboidal body consisting of fourteen planes,

The characters of this genus are, that the bodies of it are exactly of the same form with the common selenites; but that in these, each of the end planes is divided into two; and there are by this means eight of these planes, instead of four. See *SELENITES*.

**TETRADIAPASON**, *Quadruple Diapason*, a musical chord, otherwise called a quadruple eighth, or nine-and-twentieth. See *DIAPASON*.

**TETRADITÆ, TETRADITES**, in *Antiquity*, a name given to several different sects of heretics, out of some particular respect they bore to the number four, called in Greek τετρα. Thus the Sabbatians were called tetraditæ, from their fasting on Easter-day, as on the fourth day, or on Wednesday.

The Manichees, and others, who admitted of a quaternity instead of a Trinity in the Godhead, or four persons in lieu of three, were also called tetraditæ.

The followers of Petrus Fullensis bore the same appellation of tetraditæ, by reason of the addition they made to the Trifagion, to countenance an error they held, that in our Saviour's passion it was not any particular person of the Godhead, *e. gr.* the Son that suffered, but the whole Deity.

The ancients also gave the name tetraditæ to children born under the fourth moon, and these they believed unhappy.

**TETRADIIUM**, in *Botany, from τετραδιον, a party of four, as a file of four soldiers, &c. alluding to the prevalence of the number four in its parts of fructification.—Loureir. Cochinch. 91.—Class and order, *Tetrandria Tetragynia*. Nat. Ord. *Terebintacea*, Juss. ? or perhaps *Rutacea*.*

Gen. Ch. *Cal.* Perianth inferior, minute, permanent, of four spreading acute leaves. *Cor.* Petals four, ovate, incurved, or nearly erect, longer than the calyx. *Stam.* Filaments four, thick, awl-shaped, hairy, equal to the corolla in length; anthers ovate, erect, of two cells. *Pist.* Germen roundish, four-lobed; style none; stigmas four, awl-shaped, erect. *Peric.* Capsules four, roundish, bursting at the top. *Seeds* solitary, roundish, polished, tunicated.

Ess. Ch. *Calyx* inferior, of four leaves. *Petals* four. *Capsules* four. *Seeds* solitary, tunicated.

1. *T. trichotomum*. Cây dâu dàu of the Cochinchinese. Native of the hills of Cochinchina. A middle-sized tree, with ascending branches. *Leaves* pinnate, with an odd one; leaflets lanceolate, smooth, entire. *Flowers* whitish, in ample, nearly terminal, three-forked clusters; or rather, as we presume, panicles.

De Theis well remarks, that this genus appears to be allied to *BRUCEA*: we think also it is evidently very near *FAGARA* (see those articles). In deference to the weighty opinion of Jussieu, we have not, without doubt, referred it to his natural order of *Terebintaceæ*; but it appears rather to belong to his imperfectly-defined one of *Rutaceæ*, to both which articles we refer the reader.

Nothing is said by Loureiro respecting the qualities or uses of this tree.

**TETRADRACHM**, in *Ancient Coinage*, a silver coin worth four drachmas, or 3s. sterling, the drachma being valued at 9d. But if we estimate the value of the drachma at a higher rate, that of the tetradrachm will increase in due proportion. This is the largest form of Greek silver coins, excepting the tetradrachm of the Egean standard, which is worth 5s. The largest tetradrachms weighed from 430 to 440 grains. See *DRACHM* and *SHEKEL*.

**TETRADYNAMIA**, in *Botany, (from τετρα, four, and δυναμις, power, indicating a superiority of four stamens over the rest,) the fifteenth class of the Linnæan artificial system, which*

which is in itself, with the exception of one genus, *Cleome*, a natural class, comprehending all the cruciform flowers. Its essential character consists in having six stamens, four of which rise above the rest. This is indeed so naturally distinct a tribe of plants, that it is hard to trace any particular affinity between them and any others. The following is the character of the flowers.

*Cal.* Perianth oblong, of four ovate-oblong, concave, obtuse, converging leaves, projecting downwards at their base, the opposite ones most similar to each other, deciduous. The projection generally observable at the base is for the lodgment of honey, the calyx here being a nectary, so far at least as containing the honey. *Cor.* termed cruciform, of four equal petals; their claws inversely awl-shaped, or tapering downwards, flattened, erect, rather longer than the calyx; limb flat, or nearly so, the border of each petal being dilated outwards, obtuse, its sides scarcely touching its neighbour. The petals are inserted into the same circle in which the stamens are placed. *Stam.* Filaments six, awl-shaped, erect, the two opposite ones the length of the calyx, the rest rather longer, but not equal to the corolla; anthers somewhat oblong, pointed, thickest at the base, erect, their points recurved. Nectariferous glands, variously circumstanced in the different genera, are seated at the base of the stamens, especially between the shorter ones and the pistil, those stamens, to avoid pressing upon such glands, being mostly curved, by which they become shorter than the four others. *Pist.* Germen superior, daily increasing in height; style either the length of the longer stamens, or wanting; stigma obtuse. *Peric.* Pod of two valves, and frequently as many cells, bursting from the base to the summit, the partition, if present, more or less extended beyond the valves, the prominent part being the original style. *Seeds* roundish, drooping or pendulous, ranged alternately, in a double row, along the partition, in which they make slight depressions. *Receptacle* linear, surrounding the edge of the partition, and embraced by the margins of the valves.

Linnæus observes, that all systematic botanists, even the most eminent, have unanimously considered this as a truly natural class of plants. Some of them have nevertheless admitted into it, here and there, a genus or two in opposition to nature, which fault he justly conceives himself to have avoided, except with regard to *Cleome*.

The plants of this class have universally been termed antiscorbutic. Their flavour is generally acrid, though watery. Few vegetables yield less of an essential oil; yet this substance is to be obtained from them by cohobation, or repeated distillation, and its qualities are peculiarly acrid and fetid, somewhat like volatile alkali. This oil gives the offensive scent to water in which cabbage has been boiled, and it causes these vegetables to disagree with some stomachs, though they are generally reputed wholesome.

The class in question is divided into two orders, 1. *Siliculosa*, in which the pod is roundish, and for the most part hardly longer than its style. 2. *Siliquosa*, with a very long pod, to which the scarcely perceptible style bears no proportion.

The genera of the first order are distributed into two sections, one having the pod, here termed a *silicula*, or pouch, entire, and the other furnished with a notched, or emarginate, pouch. The genera here are characterised by the different shapes of their pouch, or its valves, and the comparative length of the style.

The order of *Siliquosa* is divided into such as have a close calyx, whose leaves converge longitudinally, and such as have a gaping, or spreading calyx. The genera here are

partly defined by the form of the pod and its valves, and their mode of bursting, and partly by the situation of the nectariferous glands.

These principles of generic distinction, laid down by Linnæus, have not proved so satisfactory in practice as could have been wished, inasmuch that, not only Haller, but some less controversial botanists, have differed from the learned Swede in their ideas of several of the cruciform genera. The best attempt to reform them has lately been made by Mr. R. Brown, in the second edition of Mr. Aiton's *Hortus Kewensis*. This able observer has recurred for assistance to the cotyledons, taking into consideration their being either folded or flat, accumbent or incumbent. The latter difference we believe to have been first noticed by Gærtner, in his characters of *Erysimum*. By *accumbent* is meant that the edges of the unexpanded cotyledons are applied, in a parallel manner, to the infant radicle; and by *incumbent*, that the flat side, or back, is presented to that part. The latter is seen in *Erysimum*, and is the most unusual position. The number of seeds in each cell of the pouch is also adverted to by Mr. Brown, as well as several other incidental marks; by the assistance of all which the whole tribe appears much more satisfactorily arranged than heretofore, though we do not profess to agree, in every point, with our learned friend. His *Mabbiola*, consisting of the hoary species of *Cheiranthus*, such as *incanus*, *sinuatus*, *tricuspidatus*, &c. seems less happily separated from the original genus, than his *Malcomia*, composed of *C. maritima*, *Hesperis africana*, &c. In the latter case, the simple acute stigma, incumbent cotyledons, and the habit of the plants, afford a sufficiently clear distinction. In the former, whatever difference there may be in habit, the characters seem to us not sufficiently evident or important. It is also proper to remark, that whatever assistance such a difference as that above described in the cotyledons may afford, towards forming a philosophical idea of a genus, its great obscurity renders it unfit for practical and daily use. On this subject we need not enlarge upon what Linnæus has so happily enforced, and generally practised.

**TETRAEDRON**, or **TETRAHEDRON**, formed of τετρα, *four*, and ἕδρα, *side*, in *Geometry*, one of the five regular or Platonic bodies of solids, comprehended under four equilateral and equal triangles.

The tetraedron may be conceived as a triangular pyramid of four equal faces. Such is that represented in *Plate XV. Geomet. fig. 4.*

It is demonstrated by mathematicians, that the square of the side of a tetraedron is to the square of the diameter of a sphere, in which it may be inscribed, in a subsesquialteral ratio: whence it follows, that the side of a tetraedron is to the diameter of a sphere it is inscribed in, as  $\sqrt{2}$  to the  $\sqrt{3}$ : consequently they are incommensurable. See **REGULAR Body**.

**TETRAETERIS**, τετραετηρίς, in the *Athenian Chronology*, a cycle of four years; for which see Potter, *Archæol. Græc. lib. ii. cap. 26. tom. i. p. 459.*

**TETRAGASTRIS**, in *Botany*, from τετρα and γαστήρ, *the stomach or belly*, because of the four protuberant lobes of the seed-vessel.—Gærtner, v. 2. 130. t. 109. f. 5.—Class and order, as well as Nat. Ord. unknown.

Nothing is known of this genus but its fruit, which Gærtner obtained from the collection at the botanic garden of Amsterdam. He describes it as a depressed berry, of four lobes and four cells, with solitary seeds.

Its form is nearly globose, a little depressed, convex and pointed at the summit, marked with four longitudinal furrows, separating the prominent, cushion-like lobes, into which

which it is divided below, and which form four single-seeded cells. Its diameter is above an inch. The flesh, in the old fruit at least, is thin and rather leathery. The nuts, or cells, are large, hard, undivided, gibbous at the outside, angular at the inner, moderately thick, or rather thin, whitish, not separated from each other by any intermediate pulp. *Receptacle* central, ending in the summit of the berry, producing from its upper part four short umbilical threads. *Seeds* solitary, pendulous, large, obovate, reddish-brown. *Skin* simple, thin, coriaceous. *Albumen* none. *Embryo* the shape of the seed, inverted, pale and whitish. *Cotyledons* thick, fleshy, flat on one side, convex on the other, emarginate at the insertion of the *radicle*, which is minute, seated within the notch of the cotyledons, at their upper end.

TETRAGON, τετραγωνος, formed from τετρα, *four*, and γωνια, *angle*, in *Geometry*, a quadrangle, or a figure with four angles.

Thus a square, parallelogram, rhombus, and trapezium, are tetragonal figures.

TETRAGON, in *Astrology*, denotes an aspect of two planets with regard to the earth, when they are distant from each other a fourth part of a circle, or 90°.

The tetragon is expressed by the character □.

TETRAGONIA, in *Botany*, so called by Linnæus, from τετρα and γωνια, *an angle*, alluding to the quadrangular figure of the fruit. The word is happily abbreviated from Boerhaave's *Tetragonocarpus*, which has the same meaning. —Linn. Gen. 252. Schreb. 340. Willd. Sp. Pl. v. 2. 1023. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 210. Juss. 317. Lamarek Illustr. t. 437. Gartn. t. 127. and 179.—Class and order, *Icosandria Pentagynia*. Nat. Ord. *Succulentæ*, Linn. *Ficoidea*, Juss.

Gen. Ch. Cal. Perianth superior, in four, occasionally three or five, ovate, flat, rather deflexed, coloured, permanent; deep segments, revolute at the edges. Cor. none, unless the calyx be taken for such. Stam. Filaments twenty, capillary, shorter than the calyx, into whose base they are inserted; anthers oblong, incumbent. Pist. Germen inferior, roundish, with four angles; styles four, awl-shaped, recurved, the length of the stamens; stigmas downy, running along the styles. Peric. Drupa coriaceous, quadrangular, with four prominent longitudinal wings, or points, the opposite ones narrowest, not bursting. Seed. Nut solitary, bony, of two or more cells, with oblong solitary kernels.

Eff. Ch. Calyx with from three to five deep permanent segments. Petals none. Drupa inferior, angular. Nut with several cells.

Obs. Linnæus remarks that the primary flower is five-cleft, which led him to refer this genus to the order *Pentagynia*. But it only affords an instance, among many others, that his orders of *Icosandria*, like those of *Polyandria*, except *Monogynia* and *Polygynia*, are best resolved into one, they being liable to frequent uncertainty, not only in the same genus or species, but the same individual plant. See TETRACERA.

1. *T. fruticosa*. Shrubby Tetragonia. Linn. Sp. Pl. 687. Willd. n. 1. Ait. n. 1. (*T. foliis linearibus*; Mill. Ic. t. 263. f. 2. *Tetragonocarpus africana fruticans, foliis longis et angustis*; Commel. Hort. v. 2. 205. t. 103.)—Stem shrubby, erect. Leaves linear. Fruit winged.—Native of the Cape of Good Hope. A greenhouse plant in England, ever since the time of bishop Compton, flowering in the latter part of summer, and easily propagated by cuttings, but not endowed with much beauty, or any other quality to render it popular. The stem is shrubby, bushy, with round, alternate, leafy branches. Leaves alternate, sessile, linear-oblong, obtuse, entire, revolute, downy and soft, an

inch or more in length, with axillary tufts of smaller ones. Flowers yellow, in somewhat whorled leafy clusters.

2. *T. decumbens*. Trailing Tetragonia. Ait. ed. 1. v. 2. 177. ed. 2. n. 2. Willd. n. 2. "Decand. Pl. Grasses, t. 23. (*T. foliis ovatis integerrimis, caule fruticoso decumbente*; Mill. Ic. t. 263. f. 1.)—Stem shrubby, downy, decumbent. Leaves obovate. Fruit winged.—Native of the Cape of Good Hope. A greenhouse shrub, cultivated by Miller in 1758. It differs from the former in the larger size, and broad obtuse form of its leaves, as well as in having a more glistening mealy surface, and more numerous axillary tufts of flowers. The stem is more or less decumbent, and clothed with very soft dense hairs.

3. *T. herbacea*. Herbaceous Tetragonia. Linn. Sp. Pl. 687. Willd. n. 3. Ait. n. 3. (*Tetragonocarpus africana, radice magna crassa et carnosa*; Commel. Hort. v. 2. 203. t. 102.)—Stem herbaceous, smooth, decumbent. Leaves ovate, stalked. Flowers somewhat corymbose. Fruit winged. Native of the Cape, cultivated by Miller. The root is perennial, thick, fleshy, and lobed. Herb smooth, succulent, with many decumbent, branched, annual, leafy stems, and scattered, ovate, more or less acute, entire leaves. Flowers yellow, generally five-cleft, larger, and more showy, than in the two preceding, stalked, partly axillary, partly corymbose. All our knowledge of this species is derived from Commelin's work, nor had Linnæus any specimen in his herbarium. The last-described is sometimes, in gardens, mistaken for *T. herbacea*.

4. *T. hirsuta*. Hairy Tetragonia. Linn. Suppl. 258. Willd. n. 4. Thunb. Prodr. 87.—"Herbaceous, hairy, procumbent. Leaves ovate, villous. Flowers axillary, sessile, three together."—Gathered by Thunberg, at the Cape of Good Hope.

5. *T. spicata*. Spiked Tetragonia. Linn. Suppl. 258. Willd. n. 5. Thunb. Prodr. 87.—"Herbaceous, smooth, erect. Lower leaves ovate; uppermost lanceolate. Flowers racemose."—From the same country as the last. Thunberg. We have seen no specimens of these two species. It is remarkable that the younger Linnæus defines the flowers of *T. hirsuta* sessile, whilst Thunberg calls them stalked. Possibly the latter confounded with his *hirsuta*, our *decumbens*, of which there is a specimen, apparently gathered by him, in the Linnæan collection.

6. *T. echinata*. Hedge-hog Tetragonia. Ait. ed. 1. v. 2. 177. ed. 2. n. 4. Willd. n. 6. "Decand. Pl. Grasses, t. 113."—Stem herbaceous. Leaves rhombic-ovate. Fruit prickly.—Native of the Cape, from whence Mr. Masson introduced it at Kew, in 1774. The root is annual or biennial. Stem herbaceous, divided from the base into several decumbent branches, hardly a foot long, angular, from the decurrent footstalks, which are half the length of the spreading succulent leaves, each an inch long. Flowers pendulous, on very short, axillary, solitary, thread-shaped, purple stalks clothed with crystalline globules. Calyx in three or four segments; crystalline without; greenish-yellow within. Stamens only three or four. Germen triangular, flat underneath, its angles beset with numerous conical thorns. Styles three. Nut of three cells. Willden.

7. *T. expansa*. Horned Tetragonia. Ait. ed. 1. v. 2. 178. ed. 2. n. 5. Willd. n. 7. "Decand. Pl. Grasses, t. 114." Scop. Infubr. v. 1. 32. t. 14. Thunb. Tr. of Linn. Soc. v. 2. 335. (*T. halimifolia*; Forst. Prodr. 39. Pl. Escul. 67. *T. japonica*; Thunb. Jap. 208.)—Stem herbaceous. Leaves ovate-rhomboid; tapering at the base. Fruit with four horns.—Native of New Zealand, about the borders of woods, in bushy sandy places, as well as of the Friendly islands, and of Japan. Sir Joseph Banks introduced

it to Kew garden, in 1772, and from thence the other gardens of Europe have been supplied. The plant is a rather tender biennial herb, flowering in August and September. Forster tells us it proved a most valuable resource to captain Cook's crew, as a pot-herb, while his ship lay at Tongatabu. The whole plant is succulent, covered with very minute crystalline dots, as if moist with dew. *Root* fibrous. *Stem* divided from the bottom into many irregular, round, leafy branches. *Leaves* alternate, stalked, somewhat deltoid, entire, rather heart-shaped at the base, but tapering down into the footstalk. *Flowers* yellow, axillary, on short, usually solitary, stalks. *Fruit* turbinate, clumsy, the size of a filbert, with four or five sharp horns. The cells are five or six, answering to the number of styles.

8. *T. crystallina*. Diamond Tetragonia. Ait. ed. 1. v. 2. 178. ed. 2. n. 6. Willd. n. 8. L'Herit. Stirp. v. 1. 81. t. 39. "Decand. Pl. Grasses, t. 34."—Stem herbaceous. Leaves ovate, sessile, dotted with crystalline points. Fruit without thorns.—Native of Peru. *Dombey*. Sent to Kew, by M. Thouin, in 1788. It is annual, and flowers in the dry stove in June. *Herb* a span high, covered with crystalline granules, like the Ice-plant. *Stem* nearly erect, branched from the bottom. *Leaves* acute, entire, about two inches long, bright green. *Flowers* of a dull orange, or tawny yellow, axillary, stalked, mostly solitary. *Calyx* in four segments. *Stamens* about sixteen. *Styles* four. *Drupa* turbinate, quadrangular. *Nut* four-lobed, with four cells.

For *Tetragonia ivaeifolia*, Linn. Suppl. 257, see HALORAGIS, n. 1.

TETRAGONIA, in *Gardening*, contains plants of the shrubby and herbaceous, succulent, perennial kinds, among which the species most usually cultivated are the following; the shrubby tetragonia (*T. fruticosa*); the trailing tetragonia (*T. decumbens*); the herbaceous tetragonia (*T. herbacea*); and the hedge-hog tetragonia (*T. echinata*). All these plants are natives of the Cape, and, of course, of the rather tender kind.

*Method of Culture*.—The first and last sorts may be increased by cuttings, which should be cut off from the plants a few days before they are planted, that the part where they are cut may be healed, setting them out in July, that they may have time to make good roots before winter, on a bed of fresh earth, shading them from the sun in the heat of the day. They should afterwards be frequently refreshed with water in small quantities. In a few weeks, when well rooted, they should be taken up, and planted into pots filled with light fresh undunged earth, and be placed in a shady situation until they have taken new root, after which they may be placed with other hardy exotic plants in a sheltered situation, where they may remain till the middle or latter end of October, at which time they should be removed into the greenhouse, and placed where they may enjoy as much air as possible in mild weather, as they only require to be protected from the frost, being pretty hardy with respect to cold. As, when planted in the full ground in the summer season, they are apt to grow rank and large, or even when permitted to root into the ground through the holes at the bottom of the pots, the pots should be frequently removed to prevent it, as they are injured by it.

The first and second sorts are likewise capable of being raised by seeds, sown in a gentle hot-bed, or in a warm border of light fresh earth, in the spring. When the plants are about four inches high, they may be planted out in pots, treating them in the same manner as the cuttings.

And the third sort will grow from cuttings planted early in the spring, in the same manner as the others.

The shrubby sorts are durable in their stems, roots, and

branches; but the herbaceous kinds often die down in the stalks and branches towards the autumn, and send up new ones at the end of that season, which retain their leaves during the winter months.

They afford ornament among other potted plants, and the first sort has something singular and curious about it.

TETRAGONIAS, a name given to a meteor whose head is of a quadrangular figure, and its tail or train long, thick, and uniform: this is not much different from the trabs or beam.

TETRAGONIS, in *Ancient Geography*, a town of Arafhonia, at the foot of mount Caucasus, called more anciently Cartana. Pliny.

TETRAGONISM, τετραγωνισμος, a term which some authors use to express the quadrature of the circle.

TETRAGONOPTERUS, in *Ichthyology*. See SALMO Bimaculatus.

TETRAGONOPTRUS. See ZEUS, CHLETODON Cornutus, Nigricans, and Capistratus.

TETRAGONOTHECA, in *Botany*, from τετραγωνος, quadrangular, and θεκη, a case, or cell, a name first contrived by Dillenius, to express the square form of the common calyx, and now retained by L'Heritier and Willdenow for the original and only remaining species of the genus. See the others under DIDELTA, POLYMNIA, and WEDELIA.—Dill. Elth. 378. Linn. Gen. 438. L'Herit. Stirp. 177. Willd. Sp. Pl. v. 3. 2116. Ait. Hort. Kew. v. 5. 84. Pursh 563.—Class and order, *Syngenesia Polygamia-superflua*. Nat. Ord. *Compositæ oppositifoliae*, Linn. *Corymbiferae*, Juss.

Gen. Ch. *Common Calyx* simple, large, of one leaf, in four deep, flat, spreading, triangular-heart-shaped segments, permanent. *Cor.* compound, radiant. Florets of the disk perfect, numerous, funnel-shaped, five-cleft, reflexed; those of the radius ten or twelve, ligulate, dilated outwards, three-cleft, equal, bluntish. *Stam.* in the florets of the disk. Filaments five, capillary, very short; anthers united into a cylindrical tube. *Pist.* in all the florets. Germen roundish; style thread-shaped, the length of the stamens; stigmas two, reflexed or revolute. *Peric.* none. *Seeds* solitary; in the disk roundish; in the radius somewhat ovate. Down none. *Recept.* chaffy.

Eff. Ch. *Receptacle* chaffy. Seed-down none. Calyx simple, of one leaf, quadrangular, in four deep segments.

Obs. The synonym of *Tetragonotheca*, Linn. Gen. 438, should be erased from our article POLYMNIA.

1. *T. helianthoides*. Sun-flower Tetragonotheca. Linn. Sp. Pl. 1273. Willd. n. 1. Ait. n. 1. Pursh n. 1. (*T. doronici maximi folio*; Dill. Elth. 378. t. 283. *Polymnia tetragonotheca*; Linn. Syst. Veg. ed. 13. 658. Sm. Inf. of Georgia, v. 2. 137. t. 69.)—Native of North America, in a fertile soil, on the borders of woods, and along hedges, from Virginia to Florida, flowering from July to September. *Pursh*. The root is perennial, hardy in our gardens. *Stem* erect, round, leafy, hairy, branched, from four to six feet high. *Leaves* hairy, veiny, toothed or wavy; the lowermost stalked, ovate; upper sessile; opposite acute. *Flowers* from the forks and ends of the branches, stalked, large, of a golden yellow, resembling a sun-flower.

TETRAGONUS, in *Anatomy*, a muscle, called also *quadratus gene*.

TETRAGRAMMATON, τετραγραμματον, a denomination given by the Greeks to the Hebrew name of God, יהוה יהוה *Jehowab*, because in the Hebrew it consists of four letters. See ADONAI.

TETRAGYNIA, in *Botany*, from τετρα, and γυν, a female, the name of an order in several classes of the Linnæan artificial system, characterized, as the word itself imports,

by the flowers having four styles, or pistils. This order is better founded, and more invariable, in some classes than others. With the TETRANDRIA, (see that article,) it naturally corresponds, and is well exemplified in the genera *Potamogeton* and *Ruppia*. In *Oöandria*, though of rare occurrence, it is no less certain. In *Icofandria* and *Polyandria* it is very fallible, of which we have lately given examples. (See TETRACERA and TETRAGONIA; also POLYANDRIA.) The order *Tetragynia* in the classes *Pentandria* and *Dodecandria* is, however, sufficiently well-founded. In *Decandria* no example of it occurs, nor scarcely in *Hexandria*.

TETRAHIT, an old name, supposed to allude to the four-cornered stem. See GALEOPSIS.

TETRALOGIA, in the *Dramatic Poetry of the Ancients*, denoted four dramatic pieces of the same author, of which the three first were tragedies, and the last of the satyric kind. Their design was to celebrate a victory in the literary contests. *Æschylus* and *Euripides* have written some pieces of this kind. Encycl.

TETRAMETER, in the *Ancient Poetry*, an iambic verse consisting of four feet.

The word is formed from *τέτρας*, four, and *μέτρον*, measure; *q. d.* four metres.—We meet with none of these but in the comic poets, as *Terence*, &c.

TETRANDRIA, in *Botany*, the fourth class in the Linnæan artificial system, is so called from *τέτρας*, and *ων*, a man, because it is characterized by having four stamens, in the same flower with the pistil or pistils. These are of equal length, the stamens being regular, by which this class is distinguished from the 14th, whose flowers are ringent, and two of their four stamens, which stand next each other, are longer than the rest. See DIDYNAMIA.

The orders of this fourth class are three, distinguished by the number of their pistils. 1. *Monogynia*, a numerous and various order, comprising the ample tribe of *Proteaceæ*; and the intricate family of the *Stellata*, to which *Galium* and *Rubia* belong. The large genera of *Scabiosa* and *Plantago* likewise range under the *Tetrandria Monogynia*; the former of which exhibits a curious example of aberration in number between the *corolla* and *stamens*. Some of its species have a four-cleft *corolla*, answering in that respect to the *stamens*, whilst others have five segments in the former, though the number of the latter remains invariably but four. 2. *Digynia* is a small order, to which, amongst a few other genera, *Linnaeus* has referred *Cuscuta*, but it rather belongs to *Pentandria Digynia*, the greater number of the species having five-cleft pentandrous flowers. This order will, however, receive a very curious accession in TETRARHENA. (See that article.) 3. *Tetragynia* contains *Ilex*, *Potamogeton*, and *Ruppia*, British genera, all of which have four fertile stigmas; with several others, not naturally related, but for the most part separated, by the artificial character of *number*, from their allies in other parts of the system. That character however is sufficiently constant in the present instance.

TETRANDRIA is likewise the denomination of several orders in the Linnæan System, as in *Gynandria*, if STYLIDIUM (see that article) be judged to have four stamens; and certainly in *Monoecia* and *Diœcia*, where there are several really tetrandrous genera.

TETRANGURIA, a name used by some authors for the citrul, a plant of the gourd kind, whose seeds are used in medicine.

TETRANTHERA, so named by *Jacquin*, from *τέτρας*, and *ανθή*, because of the four separate cells, which have the appearance of four distinct anthers, on the dilated summit of each filament, and were indeed considered as such by the

author. We greatly prefer this name to that of *Litsea*, used by *Lamarck* and *Jussieu*; because the latter is of barbarous origin, and because we are happy to follow the example of *Mr. Brown*, who justly prefers, in this case, the classical authority of *Jacquin*. To the learned *Jussieu* nevertheless belongs the honour of having first assembled under this genus several plants, which authors had either considered as distinct genera, or erroneously referred to others already established, as will appear by the various synonyms we are about to exhibit.—*Jacq. Hort. Schoenbr. v. 1. 59. Dryandr. in Roxb. Coromand. v. 2. 25. Brown Prodr. Nov. Holl. v. 1. 408. (Litsea; Lamarck Dict. v. 3. 574. Juss. in Bull. des Sciences, v. 3. 73. Tomex; Thunb. Jap. 10. Nov. Gen. 65. Schreb. Gen. 315. Willd. Sp. Pl. v. 2. 839. Mart. Mill. Dict. v. 4. Juss. 440. Hexanthus; Loureir. Cochinch. 195. Sebifera; Loureir. ibid. 637. See TOMEX, HEXANTHUS, and SEBIFERA.)—Class and order, *Dodecandria Monogynia*. Nat. Ord. *Lauri*, Juss. *Laurina*, *Brown*.*

Gen. Ch. *Cal.* Involucrum of four or five ovate, concave, deciduous leaves, containing several stalked flowers. Perianth none, unless the corolla be taken for such. *Cor.* of one petal, tubular, more or less deeply divided into from four to six elliptic-oblong equal segments; sometimes abrupt and entire, the limb being deficient. Nectary of several stalked glands or scales intermixed with the stamens. *Stam.* Filaments from twelve to eighteen, sometimes but six, thread-shaped, erect, the outer ones longest; anthers with four lateral cells at their inner side. *Pistl.* Germen superior, ovate; style thread-shaped; stigma notched. *Peric.* Berry ovate or globose, of one cell. *Seed* solitary, the shape of the berry.

Obs. The stamens are usually imperfect in the flowers of one tree, and the pistil in those of another; but this is hardly a sufficient reason for placing this genus in the class *Diœcia*, the structure of the flowers being alike, and both organs, at least their rudiments, present in each. The four cells of the anthers, as *Mr. Brown* observes, distinguish *Tetranthera* from *Laurus*.

Ess. Ch. Involucrum of four or five leaves, deciduous. Corolla with about five segments. Nectary of several stalked glands. Anthers of four lateral cells. Stigma somewhat lobed. Berry superior, with one seed.

1. *T. japonica*. Japan *Tetranthera*. (*Tomex japonica*; Willd. n. 1. Thunb. Jap. 190.)—Stamens twelve. Leaves obtuse; downy beneath, as well as the involucrum. Flower-stalks simple.—Common at *Kosido* in Japan, flowering in October and November.—It is there known by the name of *Firwa*. The stem is arboreous, tall, branching, above two feet in diameter. Branches downy, knotty; angular when young. Leaves alternate, stalked, oblong, obtuse, entire, erect, with parallel ribs; smooth and green above; hoary and downy beneath; three or four inches long. Footstalks angular, striated, downy, an inch in length. Flowers axillary, capitate, dioecious, on solitary, angular, downy, bracted stalks, half an inch long. The involucrum consists of five or six leaves, the outer ones smallest, and contains the same number of flowers. *Thunberg*.

2. *T. laurifolia*. Laurel-leaved *Tetranthera*. *Jacq. Hort. Schoenbr. v. 1. 59. t. 113. (Tomex Tetranthera; Willd. n. 2.)*—Stamens about fifteen. Leaves obtuse, smooth, as well as the involucrum. Flower-stalks somewhat umbellate.—Native of China. Cultivated at the *Mauritius* by the name of *Cerifer de la Chine*, or Chinese Cherry-tree. From thence it was brought to *Schoenbrun* gardens, where it bears the open air in summer, and flowers in the hot-house in September and October.—It is there a tree, ten feet

feet high, with a head of round knotty *branches*, downy when young. *Leaves* about the ends of the branches, alternate, on downy stalks, an inch long, obovate, coriaceous, entire, light green, smooth and shining, except a slight pubescence on the rib and veins; their length about five inches. *Flower-stalks* lateral, scattered, below the leaves, umbellate, about two inches long, each bearing from two to five *flowers*, whose *involucrum* is pale green, *corolla* white; their short partial stalks (within the involucre) hairy, as well as the *stamens*. *Berries* red, globose, the size of a currant. Jacquin says nothing of the dioecious nature of the *flowers*, but he appears to describe one with an imperfect *pistil*. His *fruit* perhaps was of exotic growth.

3. *T. apetalata*. Apetalous Tetranthera. Roxb. Coromand. v. 2. 25. t. 147. Brown n. 1. (*Laurus involucrata*; Retz. Obs. fasc. 6. 27?)—Stamens about fifteen. Leaves elliptical, obtuse, single-ribbed, smooth. Corolla abrupt, undivided, bearing the stamens on its margin.—Native of the mountainous parts of the circars of Hindoostan, flowering in June. Roxburgh. Mr. Brown met with the same in the tropical part of New Holland. This is said to be a middle-sized *tree*, with round smooth *branches*, leafy towards the ends. The *leaves* are stalked, three or four inches long, and two, or two and a half, wide, entire, bright green. *Flower-stalks* usually three-flowered, much like those of the last, to which this species is nearly akin; but the want of a limb to the *corolla*, and the oval violet-coloured *berry*, sufficiently distinguish it.

4. *T. monopetalata*. Monopetalous Tetranthera. Roxb. Corom. v. 2. 26. t. 148.—Stamens about nine. Leaves elliptic-oblong, acute, single-ribbed; somewhat downy beneath. Flowers clustered. Limb of the corolla half five-cleft.—Native of the vallies of Hindoostan, flowering in the hot season. Dr. Roxburgh says the *wood* is white, tolerably hard; and that the bark is used by the inhabitants of the hills, to cure diarrhœas, being given in substance. Its taste is mildly astringent, with much balsamic sweetness. The *leaves* are longer, narrower, and more acute than in the former. *Flowers* in short, axillary, dense, partly umbellate, clusters, with five leaves to the *involucrum*, and as many segments to the greenish tubular *corolla*. *Berries* ovate, of a violet black.

5. *T. ferruginea*. Rusty Tetranthera. Brown n. 2. (*Hexanthus umbellatus*; Loureir. Cochinch. 196. *Litsea hexantha*; Juss. n. 4.)—Stamens about nine. Leaves elliptic-oblong, acute, single-ribbed; downy beneath, as well as the branches. Corolla in six deep segments.—Native of Cochinchina, as well as of the tropical part of New Holland. A *tree* of a moderate size, whose timber is used in building. The *leaves* are large, entire, with many transverse veins. *Flowers* pale green, in small axillary umbels.

6. *T. dealbata*. White-leaved Tetranthera. Brown n. 3.—Stamens six. Leaves broadly elliptical, pointed, triple-ribbed, smooth; whitened beneath. Footstalks and branches downy. Corolla deeply four-cleft, hairy. Involucrum villous.—Native of the neighbourhood of Port Jackson, New South Wales. Mr. Brown thinks *Laurus Myrrha*, Loureir. Cochinch. 251, which is perhaps not specifically different from *Laurus involucrata*, Roxb. Coromand. v. 2. 46. t. 187, is very nearly related to the present species, though differing in having smaller *leaves*, a somewhat silky *involucrum* on a short stalk, and nearly smooth *corolla*. We cannot but observe that Roxburgh's t. 187. by no means exhibits the peculiar *anthers* or *nectary* of a *Tetranthera*. His plant however should seem to be the *Litsea trinervis* of Jussieu, which the latter takes for *Laurus*

*involucrata* of Retzius, but that should have single-ribbed *leaves*. See our third species.

7. *T. chinensis*. Chinese Tetranthera. (*Litsea chinensis*; Lamarck Dict. v. 3. 574. Juss. n. 5.)—Stamens numerous, polyadelphous. Leaves elliptical, obtuse, smooth. Footstalks, branches, and involucre downy. Corolla none.—Native of China; cultivated in the island of Mauritius, where its power of resisting the force of high winds, renders this tree valuable for making tall hedges. The *leaves* are four inches long, two broad; pale beneath. *Flowers* dioecious. *Involucrum* of four concave, spreading, downy leaves. *Stamens* united into from five to nine downy bundles. *Germen* surrounded with abortive stamens. *Berry* spherical, smooth, the size of a small cherry, with a flavour of camphor and ivy, which renders it disagreeable, and only fit food for birds. Lamarck. This species is said to have been brought alive to Europe, and was in 1789 cultivated in the Parisian garden; but we have neither heard nor seen any thing of it in England.

8. *T. sebifera*. Tallow Tetranthera. (*Tomex sebifera*; Willd. n. 3, excluding the synonym of Retzius. *Sebifera glutinosa*; Loureir. Cochinch. 638.)—Stamens from twelve to fifteen. Leaves ovate-oblong, bluntish, single-ribbed, smooth. Flower-stalks umbellate, downy as well as the involucre. Corolla none.—For a further account of this species, see SEBIFERA, under which article Loureiro's faulty generic character, and especially his description of the stamens, prevented our recognizing the plant as already described by Willdenow.

9. *T. piperita*. Pepper Tetranthera. (*Litsea piperita*; Juss. n. 7. *Laurus Cubeba*; Loureir. Cochinch. 252.)—Stamens six. Leaves lanceolate, without rib or vein. Stalks single-flowered. Corolla in six roundish unequal segments.—Native of Cochinchina, and perhaps also of China. In the former country it is frequently cultivated, for the sake of the cordial and tonic qualities of its berries and bark. A decoction of one or the other, the latter being weakest, is given in hysteric, paralytic, and melancholic disorders. The recent fruit is used as a seasoning for fish. The scent is fragrant; taste aromatic and pungent. Each berry resembles a grain of black pepper, with a long slender stalk. Loureiro suspected it to be the true *Cubeba*, but erroneously. (See PIPER.) The *tree* is of a moderate size, much branched. *Leaves* alternate, stalked, two inches long, entire, flat, shining, and, we presume, smooth. *Flowers* white, on crowded, lateral, simple stalks. *Involucrum* of four roundish, concave, coloured, deciduous leaves, containing five flowers. *Style* none. *Berry* globose, very small, black.—Such is Loureiro's account, from which, having seen no specimen, we have extracted the specific character.

TETRANTHUS, so called by professor Swartz, in his *Prodromus*, p. 115, from *τετρα* and *ανθος*, on account of the four flowers in one common calyx.—Schreb. Gen. 592. Willd. Sp. Pl. v. 3. 2402. Mart. Mill. Dict. v. 4. Swartz Ind. Occ. 1385. t. 27.—Class and order, *Syngenesia Polygamia-segregata*. Nat. Ord. *Compositæ capitata*, Linn. *Corymbifera*, Juss.

Gen. Ch. *Common Calyx* of five small, linear, fringed leaves, at first reflexed, then erect, containing four flowers: *partial* of one leaf, tubular, much longer than the former; tapering and somewhat compressed at the base; oblique, acute and fringed at the summit; containing one floret. *Cor.* of each floret tubular; its limb in five unequal segments, the three lowermost longest, and most reflexed. *Stam.* in each floret, Filaments five, capillary; anthers united into a cylindrical tube, rather shorter than the tube of the corolla. *Pist.* *Germen* superior, in the tube of the partial calyx, oblong; style thread-

thread-shaped, divided, spreading, longer than the corolla; stigma linear, downy, reflexed. *Peric.* none, except the permanent sheathing partial calyx. *Seeds* solitary, oblong, somewhat striated, crowned with a membranous fringed border. *Recept.* minute, naked.

*Eff. Ch.* Common Calyx of five leaves, containing four flowers: partial of one oblique leaf. Seeds with a membranous fringed border. *Receptacle* naked.

1. *T. littoralis.* Shore Tetranthus. Willd. n. 1. Swartz Ind. Occ. 1386.—Found on the banks of rivers in Hispaniola. A small annual herb, flowering in the spring, and, as Swartz justly observes, very peculiar in its fructification. There certainly cannot be a better example of the order *Polygamia-segregata*. Willdenow says it has the aspect of MITCHELLIA; see that article. The *stem* is slender, creeping, smooth, subdivided, a span long, attaching itself by little tufts of long white fibrous *radicles* from each joint. *Leaves* opposite, stalked, roundish-ovate, entire, with a short obtuse point, three-ribbed, smooth, half an inch long. *Footstalks* smooth and slender, nearly an inch in length. *Flower-stalks* axillary, solitary, erect, longer than the leaves, slender and downy. *Flowers* small, white.

TETRAO, in *Ornithology*, a genus of the Gallinæ order of birds; the characters of which are, that it has a spot near the eyes naked, or papillose, or rarely covered with feathers. It comprehends sixty-seven species, classed under several divisions and subdivisions.

A. *With the naked Spot above the Eyes, and hairy Legs.*  
LAGOPODES.

a. *With four-toed Feet.*

UROGALLUS. With roundish tail, and white axillæ. This is the cock of the wood of Ray and Willughby, and wood grouse of Pennant and Latham. (See GROUSE.) It is found in the forests and marshes of the colder parts of Europe and Northern Asia.

PHASIANELLUS. With wedge-shaped tail; head, neck, and body above, testaceous, and black-banded. This is the long-tailed grouse from Hudson's Bay of Edwards, long-tailed grouse of Latham, and sharp-tailed grouse of Pennant. Found in Hudson's Bay and the uncultivated parts of Virginia.

TETRIX. With bifurcated tail, secondary quills white towards the base. This is the urogallus minor of Brisson and Gessner, and black cock, black game, or black grouse of Ray, Willughby, Pennant, and Latham. Found in the woods, heaths, &c. of the cold parts of Europe and Siberia. (See GROUSE.) The varieties of this species are the tetrix alba of Blum. Act. Stock. 1785, and the urogallus minor punctatus of Brisson, or tetrao hybridus of Sparrman, or spurious grouse of Pennant.

NEMESIANUS. With red tail, spotted with black; black tip, and body varied with black and red: the Nemesian grouse of Latham.

BETULINUS. With black tail, varied with black transverse spots; and rump whitish, with black bands: the birch grouse of Latham.

CANADENSIS. With black tail-feathers, yellow at the tip, and two white streaks at the eyes: the black and spotted heath-cock of Edwards, and spotted grouse of Pennant, Forster, and Latham; and gelinotte du Canada of Buffon.

CANACE. With entire tail, and white spot near the ears and nostrils: the black and spotted heath-cock of Edwards. Found at Hudson's Bay.

LAGOPUS. Cinereous; hairy toes; white quills; black tail-feathers, tipped with white; the intermediate white:

this is the white game of Willughby, and ptarmigan of Pennant and Latham. (See PTARMIGAN.) Of this species there are several varieties; as the lagopus varia of Gessner and Willughby, the bonasia scotica of Brisson, and the attagen of Brisson, or red game, moor-cock, or gor-cock of Ray and Willughby, and red grouse of Pennant and Latham. (See GOR-COCK.) Found in Siberia and the northern parts of Europe.

ALBUS. Orange, varied with black bands and white streaks; hairy toes; tail-feathers black, tipped with white; the intermediate wholly white: this is the white partridge of Ellis and Edwards, and the white grouse of Pennant and Latham. Found gregarious in the forests of North America, Europe, and Asia.

RUPESTRIS. Orange, varied with black bands and white streaks; plumose toes; black tail-feathers tipped with white; the intermediate wholly white with black lores: this is the rock grouse of Pennant. Found at Hudson's Bay.

LAPPONICUS. With naked scaly legs; with a superciliary scarlet line covered with a membrane of the same colour; the primary quill-feathers and tail-feathers tipped with white: the rehufak of the Arctic Zoology. Found in the woods and mountains of Lapland.

CUPIDO. With succenturiate cervical wings: the attinga americana of Brisson, and pinnated grouse of the Arctic Zoology and of Latham. Found gregarious in North America.

UMBELLUS. With the cervical umbo exsant: this is the attagen pennsylvanica of Brisson, the ruffed heath-cock of Edwards, and ruffed grouse of the Arctic Zoology and of Latham. Found in North America.

TOGATUS. With the greater axillary feathers black-azure: this is the bonasia major canadensis of Brisson, and shoulder-knot grouse of Forster (Phil. Transf. vol. lxii.) and of Latham. Found at Hudson's Bay.

BONASIA. The tail-feathers cinereous, with black points and band; the two intermediate excepted: this is the bonasia of Brisson, the gallina corylorum of Gessner and Aldrovand, the gelinotte of Buffon, the hafelhuhn of Ray and Willughby, and hazel grouse of the Arctic Zoology and of Latham. Found among the hazels of Europe and Western Siberia.

CANUS. Body grey, undulated with brown; the beak and legs black. Found in Sweden.

ALCATA. Above varied; the two intermediate tail-feathers twice longer than the others, and subulate: the ganga of Buffon, the partridge of Damascus of Willughby and Ray, the kitiwiah or African lagopus of Shaw's Travels, the kara of Ruffel's Aleppo, the little pin-tailed grouse of Edwards and Latham. Of this there are two varieties, viz. the tetrao senegallus and gelinotte of Senegal of Buffon; and the tetrao caudatus of Gmelin's Travels. Found in Southern Europe, Africa, Arabia, Syria, and Persia.

NAMAQUA. Above spadiceous, with the two intermediate tail-feathers longer and subulate: the Namaqua grouse of Latham. Found in Africa amid the dry deserts inhabited by the Namaquis, flying gregarious to fountains.

INDICUS. Front white, surrounded by a wreath behind black; the body above yellowish-red, varied with black lunules: the Indian grouse of Latham. Found at Coromandel.

ARENARIUS. Ruff, abdomen, and vent black; tail-feathers with brown and grey bands, tipped white; the two intermediate yellowish: the sand grouse of Latham. Found about the Volga near Astrachan.

b. *With three-toed Feet.*

PARADOXUS. With three-toed feet; toes hairy, almost joined

## TETRAO.

joined at the apex: this is the heteroclitous grouse of Latham. Found in the Southern Tartarian desert.

*B. With papillose Skin about the Eyes; and naked Legs.*

*c. With the Feet of the Male Spurred.* PERDICES, or Partridges.

**FRANCOLINUS.** Abdomen and throat black, and wedge-formed tail: this is the tetrao orientalis of Hasselquist, and francolin of other authors. Found in the south of Asia and Europe, and in Africa, of the size of the partridge, feeding on seeds, emitting a hissing sound, and flesh delicious.

**MADAGASCARIENSIS.** Abdomen black, varied with large red spots; throat white; the two intermediate tail-feathers reddish, with black bands; the pintado partridge of Latham. Found in Madagascar.

**RUFUS.** Legs and beak fanguineous; throat white, surrounded with a band black, white pointed: this is the perdix græca of Brisson and Ray, the bartavelle of Buffon, the red partridge of Albin, the Greek or great red partridge of Willughby, and Greek partridge of Latham. Of this species there are three varieties, viz. the tetrao rufus of Gmelin, or perdix rubra of Brisson, or perdix rufa major of Gesner and Jonston, or red-legged partridge of Ray, Willughby, and Albin, or Guernley partridge of Latham; the perdix rufa alba of Brisson; and the perdix rubra barbarica of Brisson, or the red-legged partridge from Barbary of Edwards, or Barbary partridge of Shaw's Travels. Found gregarious in the woody mountains of Europe, Asia, and Africa, much larger than the partridge.

**PERDIX.** With a naked scarlet spot under the eyes; tail ferruginous; breast brown; and legs whitish: this is the common partridge, (which see.) Of this species there are the following varieties; viz. perdix cinereo alba of Brisson; perdix tota alba; perdix torque albo; perdix brunnea; perdix mento gulaque, or chin and throat red. Found in flocks in the cultivated fields and pastures of Europe and Siberia.

**DAMASCENUS.** With a naked scarlet spot under the eyes; tail ferruginous; breast brown; and legs yellow: the perdix damascena of Brisson, and Damascus partridge of Ray, Willughby, and Latham. This species migrates in flocks through the middle of Europe, and is allied to the partridge, but less, with a longer beak.

**MONTANUS.** Legs and beak red; throat reddish and dingy: the perdix montana of Brisson. Found in the mountains of Europe.

**RUBRICOLLIS.** Legs, beak, chin, and throat naked, all red: the red-necked partridge of Latham. Found in Africa.

**PETROSUS.** Beak and legs red; body brown, and ferruginous spot on the breast: the rufous-breasted partridge of Latham. Found amid the rocks and mountains near Gambia.

**PERLATUS.** Legs and eye-brows red; beak blackish; throat white; and body varied with brown: the perdix chinensis of Brisson, and pearly partridge of Latham. Found in China: and it has a variety with beak and legs brown, eye-brows spotted with white and black, at the Cape of Good Hope.

**BICALCARATUS.** With double-spurred feet, and black eye-brows: the Senegal partridge of Latham. Found near the Senegal.

**ZEYLONENSIS.** With double-spurred feet; beak and naked area of the eyes red; tail round and brown: the Ceylon partridge of Latham.

**SPADICEUS.** With two-spurred feet red; beak yellow;

and body spadiceous or bright red-coloured; the brown African partridge of Latham. Found in Madagascar.

**NUDICOLLIS.** With two-spurred feet, and naked throat red; the bare-necked partridge of Latham.

**GINGICUS.** Bill black; rump and tail red, grey, and black mixed; and eye-brows white: the Gingi partridge of Latham. Found near Gingi, in Coromandel.

**PONDICERIANUS.** Bill black; two intermediate tail-feathers red, numerous angulated lines brown; and four bands ochre-coloured: the Pondicherry partridge of Latham. Found in Coromandel.

**NEVIUS.** Legs and bill reddish; body brown, variegated with yellow: the oocolin of Ray and Buffon, the Mexican partridge of Latham. Found in the temperate parts of New Spain.

*d. Coturnices, or Quails.* See QUAILS.

*e. With four Toes.*

**FERRUGINEUS.** Legs and beak brown; body beneath diluted light red, above ferruginous-brown; feathers of the neck longer and acutely tipped; the hackled partridge of Latham. Found in China.

**JAVANICUS.** Legs flesh-coloured; front, spot on the hind head, and abdomen, orange; beak, breast and tail cinereous, varied with black: Javan partridge of Latham. Found in the island of Java.

**VRIDIS.** Green; legs and beak reddish; area of the eyes red; wings spadiceous: the green partridge of Latham.

**VIRGINIANUS.** With a black band above and below the eyes; vertical line yellow; the Virginian partridge of Latham. Found among the trees of America.

**MARILANDUS.** With white eye-brows; neck pointed with white and black: the New England partridge of various writers; the Maryland partridge of the Arctic Zoology and of Latham. Found in America.

**KAKELIK.** Bill, eye-lids and legs scarlet; breast cinereous; back undulated with white and cinereous. Found in Bucharia, &c.

**CASPIUS.** Cinereous, spotted with light red; the nostrils, orbits, and temples dusky. Found near Astrabad, in Persia.

**MEXICANUS.** Legs and bill fanguineous; the superciliary line white: the coturnix ludoviciana of Brisson, colcuicuitu of Ray and Willughby, the Louisiana quail of Latham. Found in Louisiana.

**FALKLANDICUS.** Variegated with brown spots and curved striæ; beneath white; bill lead-coloured; legs brown; temples spotted with white: Malouine quail of Latham. Found in the Falkland islands.

**NOVÆ HISPANIÆ.** Legs and bill black; crested head and neck variegated with white and black; body and quill-feathers yellow, the latter tipped with white: this is the grand colin of Buffon, and Mexican quail of Latham. Found in New Spain.

**COYOLCOOS.** With yellow legs; crown and neck fasciated with white and black; body above yellow, varied with white. This is the coturnix mexicana of Brisson; the coyolcozquo of Ray and Willughby, the coyolcos of Buffon, and lesser Mexican quail of Latham; the eyes are black.

**SUSCITATOR.** Variegated with yellowish, red, black and grey; bill longer. This is the coturnix javensis of Brisson, the coturnix indica Bontii of Ray and Willughby, the reveil-matin or caille de Java of Buffon, and noisy quail of Latham. Found in the woods of Java.

**STRIATUS.** With reddish legs; white eye-brows; tail, throat,

throat, lower breast and abdomen black, white-guttated: the Madagafcar quail of Latham.

**GRISEUS.** With black legs and bill; body dilutely and fordidly grey, black-banded: the grey-throated quail of Latham. Found in Madagafcar.

**COROMANDELICUS.** Head black; vertex and ocular fascia red and yellow; throat white, surrounded with a black stria; body striated; quill-feathers brown: the Coromandel quail of Latham.

**NOVÆ GUINÆÆ.** Brown; greyish legs; black quill-feathers, the covers of the wings obsoletely yellow: the New Guinea quail of Latham.

**MANILLENSIS.** Above black; legs and bill black; throat white; breast grey, spotted black; abdomen yellow, black-banded: the Manilla quail of Latham.

**CRISTATUS.** The dependent crest and throat yellow: this is the quailtzonecolin of Ray and Willughby, the zone-colin of Buffon, the crested quail of Latham. Found in Guiana and New Spain.

**SINENSIS.** Body spotted grey; throat black, with a white bow: the coturnix philippensis of Brisson, and Chinese quail of Edwards and Latham. Found in China and the Philippine isles.

**COTURNIX.** Body spotted grey; eye-brows white; the margin and lunule of the tail-feathers ferruginous: the quail of Pennant and others. Of this there are two varieties, the coturnix major of Brisson, and the coturnix wholly white.

f. *With three Toes.*

**GIBRALTARICUS.** With pale legs; black bill; quill-feathers and tail black: the Gibraltar quail of Latham.

**ANDALUSICUS.** Red, variegated with black; beneath reddish-white; legs and bill flesh-coloured: the Andalusian quail of Latham.

**NIGRICOLLIS.** Body above cinereous, variegated with red and black beneath; legs and bill cinereous; chin and throat black; quill-feathers brown: black-necked quail of Latham. Found in Madagafcar.

**LUZONNIENSIS.** Head, neck, and throat variegated with white and black; throat and breast bay; abdomen yellowish; legs and bill dilutely grey: the Luzonian quail of Latham. Found in the Manilla islands.

C. *With the Area about the Eyes covered with Feathers, but naked and tetradyte:* TINAMOU.

**GUIANENSIS.** With legs and bill brown; back variegated with cinereous brown and blackish streaks; throat cinereous; abdomen palely orange and brown. This is the partridge of Guiana of Bancroft and Latham. Found in Cayenne and Guiana.

**MAJOR.** Legs yellowish and brown; bill black; vertex red; body olivaceous; spots on the back and tail black. This is the macucagua of Maregrave, Ray, and Willughby, the magona of Buffon, the tinamou of Cayenne, the great tinamou of Latham. Found in South America, particularly in the woods of Cayenne and Guiana.

**CINEREUS.** Cinereous-brown: the cinereous tinamou of Latham.

**VARIEGATUS.** Legs and bill brown; head and neck black; body above variegated with transverse lines, light red and black; beneath red; throat and middle of the abdomen white: the variegated tinamou of Latham. Found in Guiana.

**SUVI.** Legs and bill yellow; head and neck black; body above brown; beneath red: the little tinamou of Latham. Found in Guiana,

**TETRAODON,** in *Ichthyology.* See **TETRODON.**

**TETRAPETALOUS,** in *Botany,* an epithet given to the flowers that consist of four single petals, or leaves placed around the pistil.

These M. Jussieu calls *polypetalous* flowers.

Mr. Ray, who calls them *tetrapetalous*, makes them constitute a distinct class, which he divides into, 1. Such as have an uniform tetrapetalous flower, and their seed-vessels a little oblongish, which he therefore calls *siliquose*. 2. Such as have their seed-vessels shorter, which therefore, for distinction sake, he calls *capsulate* and *siliculose*. 3. Such as have a seeming tetrapetalous flower, that is, a monopetalous one, divided deeply into four partitions, which he particularizes also as *anomalous*.

**TETRAPHARMACUM,** τετραφαρμακον, compounded of τετρα, *four*, and φαρμακον, *drug*, or *remedy*, in the general denotes any remedy consisting of four ingredients.

**TETRAPHIS,** in *Botany,* a name contrived by Hedwig, to express the four points by which the fringe of this moss is peculiarly distinguished. (See **FRINGE**.)—Hedw. Fund. v. 2. 87. t. 7. f. 32. Schreb. Gen. 758. Sm. Fl. Brit. 1179. Compend. 153.—Class and order, *Cryptogamia Musci*. Nat. Ord. *Musci*.

Eff. Ch. Capsule oblong. Fringe simple, of four pyramidal, erect, unconnected teeth.

1. *T. pellucida.* Transparent Four-toothed Moss. Fl. Brit. n. 1. Compend. 163. Engl. Bot. t. 1020. Hedw. Sp. Musc. 45. t. 7. f. 1. a-f. Sibth. Oxon. 275. Turn. Musc. Hib. 13. (*Mnium pellucidum*; Linn. Sp. Pl. 1574. M. serpilli foliis tenuibus pellucidis; Dill. Musc. 232. t. 31. f. 2.)—Capsule cylindrical. Leaves ovate, acute, single-ribbed.—Not rare in moist shady places, about the roots of trees, in various parts of Europe. It is annual, flowering early in the spring, and ripening fruit in May. The whole moss is of a bright transparent green. Root fibrous, matted. Stems mostly simple, an inch high, clothed with alternate, sessile, ovato-lanceolate, acute, entire, wavy, single-ribbed leaves, and each terminated by a solitary flower. The male flowers, far more abundant than the female, are little, round, stalked, powdery heads, each enveloped in three broad ovate leaves. The females, on a different stem, are less elevated, and more minute, each with from four to six styles, one of which only, as usual, is prolific, and the cylindrical, smooth, nearly upright capsule becomes elevated on a bright orange or crimson stalk, an inch long. The tawny veil is torn at the base. Lid conical, reddish, thin, not half so long as the capsule. Fringe remarkable for its four rigid, polished, acute, pyramidal teeth, of a shining brown, by which the genus was well characterized, even when the present was the only known species. Hedwig observed the flowers to be sometimes abortive, and replaced by buds. In the early spring he now and then met with *stamens* and *pistils* in the same flower.

2. *T. ovata.* Ovate Four-toothed Moss. Mohr Ind. Crypt. 3. Sm. Compend. 163. Grimmia Browniana; Engl. Bot. t. 1422. Bryum Brownianum; Dickf. Crypt. fasc. 4. 7. t. 10. f. 16. Orthotrichum Brownianum; Fl. Brit. 1269.)—Capsule ovate. Radical leaves ligulate, obtuse, without a rib.—Gathered by Mr. R. Brown, by the river side at Roslin, near Edinburgh; and by the late Mr. William Brunton, on sand-stone rocks at lord Grantley's lakes, near Ripon, Yorkshire. The habit of the plant, and especially the ribbed veil, caused us first to refer our imperfect specimen to *Orthotrichum*, till Mr. Sowerby thought he found the fringe to be that of a *Grimmia*. Meanwhile Mr. Funk, a German botanist, ascertained it to be formed of four teeth only, constituting a genuine *Tetraphis*,  
thus

thus adding a second species to the curious genus before us. With respect to habit, indeed, this has little resemblance to the original species. It is a minute, brownish, pellucid moss, whose foliage is all over dotted or reticulated. The *root* seems annual. *Stems* none. *Radical leaves* few, erect, linear, very narrow, a little dilated upwards, obtuse, entire, without rib or vein: those which form a *sheath*, at the base of the *fruitstalk*, short, ovate, acute, with a rib or keel. *Stalk* red, solitary, half an inch high. *Capsule* erect, smooth, ovate, brown. *Lid* short, with an oblique point. *Fringe* red, certainly of only four short, acute, firm teeth.

TETRAPHOE, a name given by the people of Guinea to a plant, which they give in decoction as a cure for fluxes. This plant grows also in Malabar, where they use the roots boiled in whey for the piles; and in the colic they give the root in powder, about a scruple for a dose. It is called in this latter place *wellia cadavalli*, and by Petiver *xanthium Malabaricum capitulis lanuginosis*. The stalks of it are woody and hoary, especially about the tops. Its leaves stand by pairs on short footstalks, and while young they are hoary underneath, with a very soft and velvety down; the others are rough, like the spotted lungwort, but seldom are so large; the flowers grow in spikes, and consist each of fine green leaves filled with scarlet filaments; after these the fruit ripens, and is a sort of woolly bur, covered with soft and hooked prickles, very like the common English burdock, but not of a third part of the size. Phil. Trans. N<sup>o</sup> 232.

TETRAPILUS, a genus of Loureiro's, in his Cochinch. 611, named from *τέτρα*, and *πίλος*, a *bat*, or *hood*, because the four segments of the corolla end each in a hooded point. Every part of the description answers to the genus *OLEA*, see that article; except that the flowers are dioecious (which indeed is of little consequence, some of the known species being subject to have the stamens and pistils occasionally in separate flowers); and the berry is said to have two cells, with several seeds. Though *Olea* therefore is known to have two cells in the young germs, there being here more than one seed, must reduce Loureiro's plant to *Ligustrum*; and it may prove very near *L. japonicum*, Thunb. Jap. 17. t. 1, though scarcely the same species.

TETRAPLA, formed from *τετραπλος*, *quadruplex*, *fourfold*, in *Church History*, a Bible disposed by Origen, under four columns, in each of which was a different Greek version, *viz.* that of Aquila, that of Symmachus, that of the Seventy, and that of Theodotion.

Sixtus of Sienna confounds the tetrapla with the hexapla; but the tetrapla is a different work, composed after the hexapla, and in favour of such as could not have the hexapla.

Some authors are of opinion, that the order in which the four versions of the tetrapla were ranged, was different from that in which we have rehearsed them; and particularly, that the Septuagint was in the first column; but St. Epiphanius says expressly to the contrary, and places it in the third. He even gives us Origen's reason for putting it there, which was, says he, that the best version might be in the middle, that the others might be the more easily confronted with it, and corrected from it.

Baronius, however, in his Annals for the year 231, takes the Septuagint to have been in the third place in the hexapla, but in the first in the tetrapla; but Epiphanius gives it the same place in both. See HEXAPLA.

TETRAPOGON, in *Botany*, so named by Desfontaines, from *τετρα*, and *πωγων*, a *beard*, because of the four awns

assembled in each calyx.—Desfont. Atlant. v. 2. 388. Willd. Sp. Pl. v. 4. 898.—Class and order, *Polygamia Monocia*, Desfont. and Willd. rather *Triandria Digynia*. Nat. Ord. *Gramina*.

Gen. Ch. *Cal.* Glume of two nearly equal, oblong, membranous, shining, awnless valves, containing three florets. *Cor.* of two valves; the outer one keeled, abrupt, villous, with a long, straight, terminal, spreading awn; inner smaller, membranous, awnless. *Stam.* Filaments three, short, capillary, deflexed; anthers oblong, emarginate, pendulous. *Pist.* Germen small, roundish, superior; styles two, short; stigmas feathery, oblong. *Peric.* none, except the permanent corolla. *Seed* solitary, invested with the corolla, but not united to it. The terminal *floret* is imperfect, but both valves are awned.

Ess. Ch. Calyx of two valves, three-flowered. Corolla of two unequal valves; the outermost abrupt, awned. Central floret imperfect; both valves awned.

1. *T. villosus*. Villous Four-bearded Grass. Willd. n. 1. Desfont. Atlant. v. 2. 389. t. 255.—Gathered by Desfontaines in sandy ground in Barbary, near Casfa. The stem is erect, about a foot high, knotty, leafy, a little compressed, smooth. Leaves linear, smooth, narrower than their long sheaths, of which the uppermost, in particular, is much inflated, embracing the base of the *spike*, which resembles that of a POLYPOGON. (See that article.) The flowers are sessile, disposed in four ranks, on a slender zigzag common stalk, or *receptacle*, their copious yellowish awns about half an inch in length, spreading every way. The outer valve of the *corolla* is clothed with copious soft spreading hairs.

TETRAPOLIS, in *Ancient Geography*. See CARPATHOS.

TETRAPOLIS, *Attica*, the name of a country of Greece, N. of Attica; in which, according to Strabo, were four towns built by Xanthus, when he reigned in this district of Greece; whence its name, from *τετρα*, *four*, and *πολις*, *city*.

TETRAPOLIS, *Dorica*, a country of Greece, in the Doride, between the country of the Etolians and that of the Enianes, according to Strabo.

TETRAPOLIS *Syria*, a country of Asia, in Syria, according to Strabo; it contained four principal towns, which had the same founder.

TETRAPTOTE, TETRAPTOTON, in *Grammar*, a name given to such defective nouns as have only four cases; such are *astus*, &c.

TETRAPYRAMIDIA, derived from *τετραεις*, *four*, and *πυραμις*, a *pyramid*, in *Natural History*, the name of a genus of spars.

The bodies of this genus are spars influenced in their shape by an admixture of particles of tin; and are found in form of broad-bottomed pyramids of four sides.

Of this genus there is only one known species, which is usually of a brownish colour, and is found in Saxony; as also in Devonshire, Cornwall, and other counties of England, where there is tin. Hill.

TETRAPYRGIA, in *Ancient Geography*, a town of Cappadocia, in Galatia.—Also, a town of Africa, upon the coast of Marmarica, before Portus-Phycus, according to Strabo.

TETRARCH, TETRARCHIA, *τετραρχη*, formed of *τετρα*, *four*, and *αρχη*, *rule*, *dominion*, a prince who holds and governs the fourth part of a kingdom.

Such, originally, was the import of the title *tetrarch*; but it was afterwards applied to any petty king or sovereign; and became synonymous with *ethnarch*, as appears from the follow-

following considerations: 1. That Pliny makes mention of six tetrarchies within the cities of Decapolis. 2. That Herod's kingdom was only divided into three parts, which yet were called tetrarchies, and the sovereigns of them (Luke, iii. 1.) tetrarchs. 3. Josephus Antiq. Jud. lib. xiv. c. 23. tells us, that, after the battle of Philippi, Antony, going into Syria, constituted Herod tetrarch; and on medals the same Herod is called *tetrarch*.

**TETRARRHENA**, in *Botany*, so named by Mr. R. Brown, from *τετραρ*, and *ῥηνη*, *male*, on account of the very remarkable character in this tribe, the grasses, of the four stamens, which Mr. Brown says he has ascertained by repeated examination.—Brown Prodr. Nov. Holl. v. 1. 209.—Class and order, *Tetrandria Digynia*. Nat. Ord. *Gramina*.

Eff. Ch. Calyx of two-valves, single-flowered. Corolla double; each of two valves, naked at the base. Nectary of two scales, opposite, alternate with the valves of the corolla. Stigmas feathery.

The inflorescence is a simple, equal, somewhat racemose spike. Flowers awnless.

1. *T. distichophylla*. Two-ranked Tetrandrous Grass. Br. n. 1. (Ehrharta distichophylla; Labill. Nov. Holl. v. 1. 90. t. 117.)—Flowers downy. Corolla ribbed, obtuse; the outermost valve half the length of the rest. Leaves straight, hairy as well as their sheaths. Stem branched at the base.—Native of Cape Van Diemen. The stem is hardly a foot high, with many erect leafy branches. Leaves lanceolate, acute, about an inch long, moderately spreading in two ranks. Spikes solitary, stalked, terminal, erect, about an inch in length, simple, the flowers almost all sessile, spreading in two rows.

2. *T. acuminata*. Pointed Tetrandrous Grass. Br. n. 2.—“Flowers smooth. Corolla ribbed; the outer glumes acute; one valve rather shorter than the inner glumes; the other longer, with a taper point. Leaves and their stems smooth. Stem branched.”—Found by Mr. Brown in the same country.

3. *T. juncea*. Rushy Tetrandrous Grass. Br. n. 3.—“Flowers smooth, imbricated. Calyx without ribs. Corolla ribbed, obtuse. Stem branched; straight and smooth like the leaves.”—From the southern coast of New Holland. *Brown*.

4. *T. lewis*. Smooth Tetrandrous Grass. Br. n. 4.—“Flowers smooth, distinct. Calyx ribbed, rather acute. Corolla obtuse, smooth, without ribs. Stems simple. Leaves smooth, flat, rather lax.”—Gathered by Mr. Brown in the same country with the last species.

**TETRASARIUS**, a word used by some of the medical writers, to express half an ounce.

**TETRASPASTON**, *τῆτρασπαστον*, in *Mechanics*, a machine in which are four pulleys. See **PULLEY**.

**TETRASTATĒR**, *τῆτραστατήρ*, in *Ancient Coinage*, a Grecian gold coin of Lyfimaachus, Antiochus III., and of some of the Egyptian monarchs. It was the quadruple chrysolus (*χρυσολος*), weighing about 530 grains, and current for 80 drachmas of silver, valued at about 3*l.*, now worth 4*l.* sterling. Some weigh 540 grains, which may be owing to the gold of such being of more alloy; though it may well be questioned, says Pinkerton (*Medals*, vol. i.), if they were ever meant to relate to the Attic standard.

**TETRASTICH**, *τετραστιχον*, a stanza, epigram, or poem, consisting of four verses.

**TETRASTĒCHON**, in *Botany*, a term often used by the Greek writers, and generally misunderstood by those who copy their accounts. Pliny has made an error in the description of the euonymus, which has confounded

two different shrubs together ever since, by mistaking the sense of this word, used by Theophrastus, in his account of it. He says, that the fruit is divided within into four orders or series of seeds; this he expresses by the word *tetraſtichon*, which Pliny, supposing to be the same with the word *tetragonon*, has translated into *granum quadrangula figura*.

But this is by no means the sense of the word which was used by the Greeks, to express that a thing had *τεταρας*; *ταξις*, four rows, orders, or series of seeds in it: nor does it at all express the seeds being square, much less its being single, for the original derivation of the word was from the term *κατα χοιρον*, used in dances. These were composed of several series of persons, called *χοιροι*, *ſtæchi*; and every *ſtæchon* consisted of several persons, who all moved together. See **EUONYMUS**.

**TETRASTYLE**, formed from *τέτρα*, *four*, and *στυλος*, *column*, in the *Ancient Architecture*, a building, and particularly a temple, with four columns in its front.

**TETRASYLLABICAL**, a word consisting of four syllables.

**TETRATHECA**, in *Botany, received that name from the writer of the present article, in allusion to the four cells of its anthers, the word being compounded of *τετρα*, and *θηκη*, *a case*, or *cell*. Mr. Brown indeed, in his *General Remarks on the Botany of Terra Australis*, p. 12, offers some observations tending to invalidate this name and character. But it appears to us, that they both derive confirmation from the consideration, of which we are well aware, that most anthers have four cells when young, though, as they burst lengthwise, the partition of each cell is obliterated. Whereas the peculiarity of our *Tetratheca*, admitted by our intelligent friend, consists in the four cells remaining unaltered, because the pollen is discharged by a terminal tube or orifice; nor is it of any great consequence that he has found, in some species, the partition to be obliterated, in an advanced state of the anthers. *Ceratopetalum*, for example, is a good name and a well-marked genus, though there is a species destitute of petals. With respect to the natural order, and the situation of the singular appendage to the seed, in the genus before us, we gladly profit by Mr. Brown's correction, hoping to be pardoned, though we may have made several false steps, in the totally strange wilderness of New Holland plants, which we were among the first, without any guide, to attempt to lay open to botanists.—Sm. Bot. of New Holl. 5. Exot. Bot. v. 1. 37. Willd. Sp. Pl. v. 2. 321. Ait. Hort. Kew. v. 2. 347.—Class and order, *Oëandria Monogynia*. Nat. Ord. akin to *Polygalæ*, a new order to which *Polygala* is referred; but in Mr. Brown's opinion constituting, along with another genus, a still different order, which, from the name destined for that genus, he chooses to denominate **TREMANDREÆ**, of which we propose to treat in its proper place.*

Gen. Ch. *Cal.* Perianth inferior, in four deep equal segments, deciduous. *Cor.* Petals four, obovate, equal, many times longer than the calyx. *Stam.* Filaments eight, inserted into the receptacle, very short, equal, erect, simple; anthers terminal; oblong, somewhat curved, much shorter than the corolla, with four longitudinal furrows, and as many cells, and terminating in a simple tubular beak, through which the pollen is discharged. *Pistl.* Germen superior, very small, obovate, compressed; style vertical, cylindrical, simple, hardly so long as the anthers; stigma simple. *Peric.* Capsule obovate, compressed, of two cells and two valves, the partitions from the middle of each valve. *Seeds* one or two in each cell, oval, pendulous, with a naked scar, but crowned, at the opposite end, with a twisted crest.

Eff. Ch. Calyx four-cleft, inferior. Petals four. Anthers beaked, with four cells. Capsule of two cells and two valves, with partitions from their middle. Seeds crested, about two in each cell.

1. *T. juncea*. Rushy *Tetratheca*. Willd. n. 1. Ait. n. 1. Sm. Bot. of New Holl. 5. t. 2.—Smooth. Leaves alternate, lanceolate. Stem with sharp angles. Branches elongated, and almost naked.—Native of New South Wales, from whence we received drawings and specimens, through the hands of Dr. John White, soon after the settlement of the colony there. This plant was sent to Kew, by Mr. Peter Good, in 1803, and it is marked as flowering in July and August, being kept in the greenhouse in winter. The root is woody, small, perennial. Stems somewhat shrubby, much branched even from the base; the branches long, slender, very acutely angular, so as to be almost winged, leafy, smooth like every other part. Leaves generally few and small, acute, sessile, entire, with a strong mid-rib. Stipules none. Flowers scattered along the branches, on simple solitary red stalks, about an inch long, each from the bosom of a diminished leaf, and making a very elegant appearance. The calyx is red. Petals crimson or rose-coloured, three-fourths of an inch long. Anthers purplish-brown, tipped with yellow. We have a variety with white petals, the calyx and stalks of which preserve their usual colour.

2. *T. cricifolia*. Heath-leaved *Tetratheca*. Sm. Exot. Bot. v. 1. 37. t. 20.—Leaves whorled, linear, revolute, minutely toothed. Stem rough with ascending bristles. Flower-stalks and calyx very smooth. From the same country as the foregoing, and sent, with drawings, at the same time. This is of more humble growth than *T. juncea*, and much more leafy. The leaves are four, five, or more, in each whorl from top to bottom of the stem and branches, sessile, narrow, about half an inch long; their edges, and sometimes their upper surface, near the point, rough with minute teeth. Flowers rose-coloured, drooping, about half the size of the foregoing, on simple, solitary, axillary stalks, as long as the leaves. Anthers purple, with yellow tips, badly represented by the engraver, who mistook the original drawing of the section of an anther, for the germen, and altered it accordingly. Capsule ovate, emarginate. Seeds with a small white crest, mostly two in each cell.

3. *T. glandulosa*. Glandular *Tetratheca*. Sm. Exot. Bot. v. 1. 39. t. 21.—Leaves imperfectly whorled, lanceolate, revolute, toothed with little spines. Stem downy. Flower-stalks and calyx rough with glands.—Sent intermixed with the last, from New South Wales. The specimens of both appeared to have been burnt down to the ground, probably by fires made by the savages in the woods, and had grown up again; which proves them to be perennial plants, though scarcely shrubby. The size of the present species, and its general aspect, agree with *T. cricifolia*, but the corolla and anthers are of a darker tint. The stem is clothed with very short close down, by no means bristly; while the flower-stalks and calyx, instead of being smooth, are covered with glandular hairs. The leaves are rather broader, and less whorled, being often merely opposite, or even dispersed.

4. *T. thymifolia*. Thyme-leaved *Tetratheca*. Sm. Exot. Bot. v. 1. 41. t. 22.—Leaves whorled, lanceolate, toothed with little spines. Stem, flower-stalks, and calyx rough with ascending bristles.—From the same country. Rather larger than either of the two last, and readily distinguished, at first sight, by its broader less revolute leaves. The bristly hairs clothing the flower-stalks and calyx are its peculiarly distinguishing character. The flowers are of a fine crimson, with violet anthers, whose tips are yellow. Few

genera are more peculiar, or more elegant, than *Tetratheca*, and the species are all worthy of a place in our collections.

TETRATONON, is the Greek name of an interval of four tones; which in modern music is usually called the superfluous or sharp fifth.

TETRAX, in *Ornithology*, the name of a bird of the *otis* or bustard kind, called by some authors *anas campestris*, or the field-duck, and also little bustard; and by some others, the *canna*. See OTIS.

It is a very common bird in France, where it is called *caille patriere*: it is called *anas*, from its sitting on the ground, just as the duck does on the water. It is of the size of a pheasant, and has a beak like that of the common hen. It is taken with nets, as the partridge: it runs very swiftly, and, like the bustard, has no hinder toes. Its belly is white, and its back is variegated with grey, red, and black. It feeds on vegetables, and on small insects.

TETREUMA, in *Botany*, a name given by the people of Guinea to a species of shrub, very common among them, and used to cure whitlows. They dry the leaves, and reduce them to powder; and, moistening them with any liquor, apply them to the place. Petiver has called this *arbor Guineensis laurustini facie*, from its great likeness to the common shrub which we call the laurustine. The leaves are opaque and stiff, and are an inch and a quarter broad, and two inches and a half long. These stand alternately on all sides of the stalk, and are fixed on short pedicles. The flowers grow out of the bosoms of the leaves, and stand in clusters in the manner of those of the common laurustine. Phil. Trans. N<sup>o</sup> 232.

TETRICA, in *Ancient Geography*, a town of the Sabines, placed by Varro in the environs of mount Fiscellus, which lay northward. Servius on Virgil says, that it belonged to Picenum, because in his time, its limits had been changed. The Abbé Chaupé places it where we now find Leoneffa. There we find the terrible rocks, horrentes rupes, mentioned by Virgil.

TETRICUS MONS, a scraggy mountain of Italy, in the country of the Sabines. Pliny.

TETRINA, in *Geography*, a town of Russia, in the government of Archangel, near the White sea; 100 miles N.N.W. of Archangel.

TETRIX, in *Ornithology*, a species of *tetrao*; which see.

TETRODON, in *Ichthyology*, a genus of the Branchiostegi order of fishes, according to the arrangement of Gmelin; the characters of which are, that the jaws are long, divided at the tip; the branchiæ or gills have a linear aperture; the body is roughened beneath, and the ventral fins are wanting. The fishes of this genus, like the Chiodon, have the power of inflating their bodies at pleasure, by means of an internal membrane, and during this time the small spines of the sides and abdomen rise so as to be a defence against their enemies. They live principally on crustaceous and testaceous animals. Gmelin enumerates thirteen species.

SCELERATUS; the Noxious Tetrodon. Tetragonal, with very large head; length two feet or more. Found in the American and Pacific oceans, and considered as highly noxious, producing, when eaten, very severe symptoms.

TESTUDINEUS; a Tortoise-shell Tetrodon. Abdomen plane, smooth, and back with white curved sutures; length two feet; colour rufous-brown above, marked by numerous round pale blue spots; beneath bluish or ash-coloured, beautifully varied by longitudinal brown streaks; fins and tail bright ferruginous; the whole abdomen is furnished with numerous small spines, which, when the animal is undisturbed, are imbedded in corresponding cavities in the skin, but

but elevated, when the fish is alarmed and disturbs its body. Found in the Indian seas.

**LAGOCEPHALUS**; Hare Tetrodon. Abdomen aculeated; smooth body, and prominent shoulders; length twelve inches; thick in front; hinder parts tapering suddenly towards the tail; colour above yellowish-brown, beneath whitish with a silvery cast; across the back marked with short, black, or dark-brown bars, and over the sides with many, scattered, round, blackish spots; sides and abdomen beset with radiated spines; fins small, and tail slightly rounded. Found in the Indian and American seas; and straying into northern latitudes, are taken about the British coasts. This fish has the power of inflating the abdomen to a large size; and derives its name from the resemblance of its head to that of a hare.

**LINEATUS**. With brown and pale bands; length ten or twelve inches, square shape; and when inflated, like the last; body beset with small spines; colour grey on the abdomen, with longitudinal, deep-brown streaks; fins and tail as in the last species. Found in the Indian and American seas, and also in the river Nile.

**ELECTRICUS**. With red, green, and white spots; above brown, and beneath sea-green; yellow at the sides, and green fins; length seven or eight inches; eyes large, with red circles. Found in the Indian and American seas, among coral rocks; and when touched with the hand, affecting it with an electric or galvanic shock.

**OCELLATUS**. Ocellated on the shoulder-band; length six or eight inches; thick, ovate shape, contracting towards the tail; colour deep green above, paler on the sides and abdomen, which are whitish; across the middle of the back, as far as each pectoral fin, a broad black crescent, edged with yellow; dorsal fin situated on a round black spot with yellow edges; lateral line from beneath the eyes to the tail, which is small and roundish; under parts beset with many spines. Found in the Indian seas and adjoining rivers, particularly those of China and Japan; very poisonous in its nature, and it is prohibited to be eaten under very severe penalties by the emperor of Japan.

**SPENGLERI**. Head bearded with many cirri; lengthened shape; above brown-coloured, with roundish deep brown spots; abdomen tumid, whitish, and beset with small spines; with cirri or soft prominences dispersed about the upper parts of the body. Found in the Indian seas, ten or twelve inches in length.

**HANKENII**. With lower jaw longer than the upper; length eight or ten inches; like the former in general appearance; above brown-coloured, with small whitish clouds or spots; beneath whitish, with small spines. Found in the Indian seas.

**ORLONGUS**. Oblong, with equal jaws; length six inches; lengthened shape; colour whitish, with grey back, marked by many semi-decurrent brown bands; fins and tail cinereous; two lateral lines, one near the back, the other near the abdomen. Found in the Indian seas.

**ROSTRATUS**; Snouted Tetrodon. Both jaws elongated to the beak; length a few inches; oblong-ovate shape, contracting towards the mouth and tail; snout lengthened and slightly tubular; colour blueish-brown, beneath whitish; fore-part of the abdomen beset with spines, few over the back; fins brown. Found in the Indian seas.

**LÆVIGATUS**; Smooth Tetrodon. With the abdomen aculeated in front; a large species; blueish above, with two white stripes on each side; under parts white; from the mouth to the end of the pectoral fins aculeated; the other parts being smooth. Found in the American seas.

**HUSRIDUS**. Entirely hispid, with bristly papillæ; length

two feet; shape, when inflated, like that of *T. lagocephalus*; colour whitish; upper parts marked across the back by three or four semi-decurrent brown bands; whole body beset with small spines. Found in the Mediterranean and Indian seas. Small remains of this species are said to occur among the petrifications of mount Bolca near Verona.

**MOLA**. Unarmed, sharp, compressed, rounded; a very short rounded tail; dorsal fin annexed to the anal, with oval spiracles. (See *SUN-FISH*.) Dr. Shaw has made a distinct genus of the sun-fish under the name of *cephalus*, the characters of which are, that the jaws are bony, and body terminating abruptly, so as to resemble the head of a fish. This genus comprehends the mola, or short sun-fish; the oblong sun-fish, with truncated body, or oblong diodon of Pennant (see *SUN-FISH*); the variegated, with whitish undulations and spots; and the Pallasian C. or silvery sun-fish, with brownish back, and spiny carinated abdomen. The mola, or short sun-fish, is a native of the European seas. Its general colour is brown, with a silvery cast on the sides and abdomen; the skin rough; the pectoral fins small, rounded, and placed horizontally; the dorsal and anal fins placed opposite, and of a lengthened shape, with rounded tips continued into the tail-fin. This fish is sometimes seen lying on its side, on the surface of the water, when it may be easily taken. In the Northern seas it arrives at a vast size, of the length of eight or even ten feet, and 500 pounds in weight: it is supposed to feed principally on shell-fish, and in the night it is said to exhibit a high degree of phosphoric splendour.

Of this there is a variety, *viz.* the *truncatus*, unarmed, smooth, compressed, oblong, with a very short tail, the dorsal and anal fins annexed, with lunated spiracles. This is the oblong sun-fish of Pennant.

**STELLATUS**; Spherical Grey Tetrodon. Whitish beneath, with the body beset with radiated spines: the tetrodon étoilé of Cèpede. Length twelve or fourteen inches; shape, when inflated, nearly spherical; colour greenish, deeper on the back, marked with dusky specks; under parts whitish; vent surrounded by a black circle; whole body covered with small stellated or radiated spines; dorsal fin rounded at the tip, and attached at the base by a kind of footstalk; tail oval. Found in the Indian seas. Shaw.

**PUNCTATUS**; Spherical Brown Tetrodon. With black specks, whitish abdomen, and very narrow dorsal fin: the tetrodon pointillé of Cèpede. Resembling the former. Found in the Indian seas. Shaw.

**MELEAGRIS**; Pintado Tetrodon. Brown, speckled with white. Found in the Indian seas, and when taken, making a kind of grunting noise, like several others of this and neighbouring genera.

**TETSCHIN**, or **TETZIN**, or *Dietschin*, in *Geography*, a town of Bohemia, in the circle of Leitmeritz, on the river Elbe; 15 miles N. of Leitmeritz. N. lat. 50° 46'. E. long. 14° 17'.

**TETSI**, a town of Thibet; 27 miles E. of Lassa.

**TETT**, a place now in ruins, situated to the south of Azamore, on the northern extremity of the bay of Mazagan, in the empire of Morocco; the name signifies in Arabic Titus, and is therefore supposed to denominate the ruins of Titus, founded by the Carthaginians.

**TETTER**, a disease among animals, which is of the ring-worm kind, and which runs or spreads itself upon the skin in different directions, whence probably it has received the name. It attacks different parts, but is most commonly met with on and about the rump, not unfrequently running down upon the joints of the tail for some distance.

It is of a scabby itchy nature and appearance, and when neglected,

neglected, is said to have sometimes become of the quality of canker, in some sorts of animals. In cases where it fixes upon the more fleshy parts of the bodies of the animals, it is often attended with such troublesome itchings, as to cause them to rub themselves against posts, walls, and other places, until they rub off and destroy the very hair and skin of the parts. Nay, the animals will, it is said, sometimes even tear off the flesh with their teeth, if they can come at the parts.

The cure of the disease may mostly be accomplished by the use of a ball composed of from half a drachm to a whole one of calomel, or more, according to circumstances, in union with some sort of cooling purgative powder: or a powder constituted of crude antimony, æthiops mineral, and cremor of tartar, of each about half an ounce; which should be given once or twice a day in a quart of oat-meal gruel. At the same time, washing the parts well with Goulard water, and afterwards applying a little of an ointment composed of sulphur, blue ointment, and hog's-lard to them.

The animals should be well taken care of while the cure is going on.

**TETTIGES**, τῆτιγγες, *grasshoppers*, in *Antiquity*, a title the Athenians assumed to themselves. See **GEGENES**.

**TETTIGOMETRA**, in *Entomology*, a name by which the ancients called the nymph of the cicada, or *tettyx*; and they named this nymph, from which they frequently saw that fly hatched, *tettigometra*, which signifies the *mother of the cicada*. See **HARVEST-FLY**, **CICADA**, and **VEGETABLE-FLY**.

**TETTIGONIA**, a word used by the ancients to express the smaller species of cicada, with which they were acquainted. They called the larger *acheta*.

It is generally supposed, that the tettigonia was the same with our smallest kind, called by the French *cigalon*; but M. Reaumur observes, that as the ancients knew two kinds of the cicada, we know three; and that our middle one seems to have been their tettigonia or small cicada, and that they were not acquainted with our smallest kind, or *cigalon*, which is not larger than a hornet.

**TETTIGONIÆ** of Linnæus. See **GRYLLUS**.

**TETTIGONIÆ** of Fabricius. See **CICADA**.

**TETTANANG**, in *Geography*, a town of Germany, and principal place of a lordship of the same name, united with Montfort, ceded to Bavaria by the peace of Presburg; 8 miles N. of Lindau.

**TETTOVA**, a town of European Turkey, in Macedonia; 13 miles W. of Skopia.

**TETTUA-MOTU**, a cape on the E. coast of New Zealand, the N.E. point of Poverty bay. N. lat. 38° 36'. W. long. 181° 30'.

**TETUAN**, **TETAWAN**, or *Tetteget*, a town of Africa, in the empire of Morocco and province of El Garb, situated near the river Busega, about a league and a half inland from the Mediterranean, and inhabited by Moors and Jews; who for the most part speak a corrupt Spanish, in which language their commercial negotiations are transacted. They are genteel in their persons and polite in their manners. The environs of Tetnan are planted with vineyards and gardens, which are kept in good order, and which produce more excellent fruits than those in other parts of the empire. From the raisins and figs the Jews distil an ardent spirit (called Mahaya), which, at the age of a year, resembles the Irish usquebaugh, and it is preferred to English brandy and rum. Of this they drink immoderately, and generally take a glass before eating. Leo Africanus attributes the foundation of this town to the people of Africa. It was

afterwards embellished, and the population increased, when the Moors were driven out of Spain. This was the place of residence for many of the consuls of the European powers, till the year 1770, when the reigning emperor, Seedy Mahomed, would no longer permit them to remain, nor again to establish themselves in the place. The port of this town has kept a trading communication with Gibraltar, whence the ships come to victual, when the wind is in the west, and does not allow them to make Tangiers. The shore of Tetuan is only safe when the wind is in the west, at which time ships ride securely; but when it veers to the east, they must remain here no longer. Our fleets often victual and water here, and this was the case with that of the immortal Nelson, previously to his victory in Aboukir bay. Tetuan is said to contain 16,000 people; 30 miles S.E. of Tangiers. N. lat. 35° 30'. W. long. 5° 20'.

**TETYAN HEAD**, a cape on the W. coast of the island of Mindanao; near which is a harbour that may be entered without danger. N. lat. 7° 20'. E. long. 124° 36'.

**TEVAKUN**, a town of Persia, in the province of Khorassan; 45 miles E.S.E. of Meshid.

**TAVARA**, a town of Naples, in Capitanata; 5 miles N.E. of Volturara.

**TEUBER**, or **TEUBERINN**, **ELISABETH**, in *Biography*, a celebrated German opera singer, and élève of the famous Tesi. She was chiefly attached to the court of Vienna, where she resided in 1772. She had sung at Naples in 1769 with great applause; but was peremptorily ordered by her physicians never to sing again. Her health had been so much impaired in Russia, where she had remained three years, that the whole faculty was unanimous in pronouncing that the exercise of her profession would be fatal. However, in spite of this prediction, she afterwards recovered her health and voice sufficiently, in a journey to Italy, to appear again on the stage at Naples in 1785; where, finding that her voice had somewhat lowered its pitch, she performed the principal man's part in contralto, to the entire satisfaction of the public. She was the daughter of a famous violinist in the emperor's service; she had lessons in singing from Haffe, in acting from the Tesi, and often sung in the operas of Haydn at Esterhazy.

**TEUCHERN**, in *Geography*, a town of Saxony, in Thuringia; 18 miles S.W. of Leipsic.

**TEUCHITES**, in *Botany*, a name used by some for the *scananth* or *schananth*, camel's hay, which ought to be written *teuchitis*. There is a city *Teuchis* in Egypt, near the borders of Arabia, and the geographers all mention a lake in the neighbourhood of this city; in this lake it is probable the *schananth* might grow; and being gathered there, and sold in the adjoining city of *Teuchis*, the purchasers might distinguish it with an epithet formed of the name of the place where they bought it. See **SCANANTH**.

**TEUCHTLACOT-ZANHQUI**, in *Zoology*, a name by which the natives of some of the American nations call the rattle-snake.

**TEUCRIUM**, in *Botany*, an ancient name, whether applied to any species of this genus, or of any other, because the plant was discovered by Teucer the Trojan prince, or dedicated to him, or found in the country of Troy, sometimes called *Teucris*, we must humbly profess our inability to form any opinion or conjecture.—Linn. Gen. 287. Schreb. 384. Willd. Sp. Pl. v. 3. 13. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 606. Prodr. Fl. Græc. Sibth. v. 1. 390. Ait. Hort. Kew. v. 3. 365. Schreb. Unilab. 26. Pursh 405. Tourn. t. 98. Juss. 112. Lamæck Illustr. t. 501. (Polium; Tourn. t. 97. Chamædrys; Tourn.

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t. 97.)—Class and order, *Didynamia Gynnospermia*. Nat. Ord. *Verticillata*, Linn. *Labiata*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, cloven half way down into five acute, nearly equal, segments, gibbous on one side at its base, permanent. *Cor.* of one petal, ringent. Tube cylindrical, short, ending in an incurved throat. Upper lip erect, acute, divided throughout into two distant segments, divaricated towards each side: lower spreading, three-cleft; its lateral segments resembling the upper lip, nearly erect; the central one roundish, and very large. *Stam.* Filaments four, awl-shaped, longer than the upper lip of the corolla, ascending, curved, prominent between its divisions; anthers small, incumbent. *Pist.* Germen superior, deeply four-lobed; style thread-shaped, agreeing with the stamens in size and position; stigmas two, slender, acute. *Peric.* none, the unchanged calyx containing the seeds in its concave base. *Seeds* four, roundish, reticulated or wrinkled.

Eff. Ch. Upper lip of the corolla deeply divided, beyond its base, divaricated. Stamens prominent.

Obs. The upper lip of the corolla being so deeply divided, even below its base, into the tube itself, and its segments so far asunder, there seems to be no upper lip at all. The latter however is more truly the case in *Ajuga*, to which, and not to *Teucrium*, belongs the *Chamapitys* of Tournefort; its upper lip being, in a manner, cut away. *Teucrium* of Tournefort has a bell-shaped calyx, and the middle segment of the lower lip of its corolla concave. *Polium* of the same author has its flowers collected into dense terminal heads. His *Chamædryas* has axillary flowers, and a tubular calyx. *Marum* of Boerhaave has thyme-like leaves, and a peculiarly pungent smell. *Scordium* of Ray and Rivinus has the odour of garlic. *Iva* of Dillenius has the calyx very protuberant at the lower part. All these nevertheless form together a most natural and well-defined genus, whose qualities are more or less aromatic or bitter; its habit usually herbaceous, mostly perennial, often shrubby; leaves opposite, simple, though in some instances much divided; pubescence various, but hardly ever absent; flowers blue, red, yellow, or whitish, axillary, solitary or whorled, panicled or capitate; their incurved stamens and style always very conspicuous between the divisions of the upper lip.

Thirty-five species are enumerated in the fourteenth edition of Linn. Syst. Veg. from which *Chamapitys*, *Iva* and *salicifolium* are to be removed to *Ajuga*. Willdenow, after making these deductions, has sixty-four. He follows Schreber and others, in making many more species out of the allies of *Polium*, than Linnæus would ever allow to be more than varieties. Two new ones from Crete are added in the Prodr. Fl. Græc. The genus is generally European, but not entirely so, and for the most part inhabits warm sunny climates. No attempt has been made to distribute it into sections. We shall indicate some traces of such, as we select the more curious or remarkable species for illustration, describing all the British as well as the new ones.

*T. campanulatum*. Bell-shaped Germander. Linn. Sp. Pl. 786. Willd. n. 1. Ait. n. 1. (*T. lupinum*, perenne, palustre, apulum, glabrum, foliis laciniatis, flore albo; Till. Pis. 163. t. 49. f. 1.)—Leaves many-cleft, nearly smooth. Flowers axillary, solitary. Calyx awned. Stem procumbent.—Native of moist situations, in Italy and the Levant. Miller appears to have cultivated it in 1728, but the true plant is now scarcely to be seen in our gardens, and is little known to botanists. The synonym of Tilli has no right to be marked as a variety, answering exactly to the Linnæan specimens and description, nor do we find any other figure of this species. Schreber seems to have mislead Willdenow,

to quote a synonym of Rivinus, which has no existence. This we find transcribed into Hort. Kew. with a correction of t. 14 for 24; though nothing but *T. Botrys* is there to be seen. No less incorrectly is Rivinus, t. 19, cited by Willdenow, after Schreber, for *T. orientale*; as Dr. Sims has noticed in Curt. Mag. 1279. *T. campanulatum* is a very distinct, perennial, herbaceous, nearly smooth, species, whose stems are square, leafy, more or less prostrate and creeping. Leaves an inch long, twice three-cleft, with bluntish, notched, slightly revolute segments. Flowers axillary, solitary, opposite, stalked, with a large, bell-shaped, rather pungent-pointed, calyx. The corolla is said to be white.

*T. levigatum*. Smooth Yellow Germander. Vahl Symb. v. 1. 40. Willd. n. 2.—Quite smooth. Lower leaves many-cleft; upper three-cleft, entire. Flowers axillary, solitary. Segments of the calyx oblong, without awns.—Gathered at Monte Video, by Commerfon, whose specimen is before us. This species is larger in all its parts than the foregoing, and appears to be herbaceous and erect, quite smooth, except a slight downiness, here and there, upon the young branches or stalks. Leaves stalked, an inch and half long, deeply divided into three wedge-shaped, jagged, blunt, very smooth and flat, lobes; the upper, or floral, ones much smaller and narrower, simply three-cleft. Flowers yellow. Segments of the calyx oblong-lanceolate, with one central rib and two marginal ones, acute, but not tipped with any awn or bristly point.

*T. orientale*. Great-flowered Germander. Linn. Sp. Pl. 786. Willd. n. 3. Ait. n. 2. Curt. Mag. t. 1279. (*T. orientale angustifolium laciniatum, flore magno subcæruleo; Comm. Rar. 25. t. 25.*)—Leaves deeply three-cleft, many-cleft, linear. Clusters terminal, compound. Flower-stalks horizontal, longer than the floral leaves.—Native of the Levant. Cultivated by Miller, and recently restored to our gardens by seeds obtained from Siberia, by Mr. Loddiges. The root is perennial. Several decumbent branches from the root bear leaves divided into many linear segments; but the foliage of the erect panicled flowering stem is doubly three-cleft below, simply above. Inflorescence terminal, racemose, compound, with small bracteaceous leaves. Flowers numerous, almost as large as those of *T. fruticosans* hereafter described, of a light purplish-blue. All the herbage, and even the corolla, is hairy or downy. We have already mentioned, under our first species, that the citation of Rivinus by Willdenow is an error.

*T. Botrys*. Cut-leaved Annual Germander. Linn. Sp. Pl. 786. Willd. n. 5. Ait. n. 3. Mill. Ic. t. 264. f. 1. (*Iva moschata, folio multifido; Riv. Monop. t. 14. Chamapitys fœmina; Ger. Em. 525.*)—Leaves many-cleft. Flowers axillary, opposite, in pairs, turned one way. Calyx tubular, inflated and gibbous at the base.—Native of Germany, Switzerland, France and Italy, in dry fields. Root annual, fibrous. Herb hairy, branched from the bottom, erect. Leaves deeply pinnatifid, somewhat three-lobed. Flowers stalked, crimson, four together, making a sort of half whorl. The calyx becomes greatly enlarged after flowering, tubular, remarkably inflated below, and terminating in five triangular, awned, converging teeth.

*T. trifidum*. Trifid-leaved Germander. Retz. Obs. fasc. 1. 21. Willd. n. 7. Ait. n. 5. (*T. capense; Thunb. Prodr. 95.*)—Leaves hoary, in three deep linear segments. Stalks axillary, three-flowered. Calyx hoary, without awns.—Gathered at the Cape of Good Hope, by Thunberg and Masson. The latter sent seeds to Kew in 1791. The plant is shrubby, flowering most part of the summer, and kept in the greenhouse in winter. Its aspect is not unlike Winter Savory, but more hoary. The segments of the

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*leaves* are an inch long, revolute, entire. *Flower-stalks* half the length of the leaves. Segments of the *calyx* elongated, lanceolate, revolute, single-ribbed, bluntly pointed, not awned. *Corolla* purplish. *Seeds* with a net-work of wrinkles over their surface.

*T. Pseudo-chamæpitys.* Racemose Slender-leaved Germander. Linn. Sp. Pl. 787. Willd. n. 8; excluding the synonym of Clusius. (*Chamæpitys alia*; Camer. Epit. 680. *Chamæpitys spuria* alterius altera icon; Dod. Pempt. 47.)—Leaves deeply once or twice three-cleft, linear, acute, revolute, hairy. Cluster terminal, simple. Bractæas three-cleft. Calyx hoary, awned.—Native of Spain, Barbary, and the south of France. The *stem* is shrubby, divided from the bottom into many ascending, leafy, square, mostly hairy branches. *Leaves* in very narrow, somewhat awned, segments, more or less hairy. *Flowers* much like those of *T. orientale*, but forming a simple terminal *chysler* at the top of each branch, with deeply three-cleft linear *bractæas*, usually as long as the *flower-stalks*. Lip of the *corolla* externally hairy. The *Pseudo-chamæpitys* of Clus. Hist. v. 2. 185. Lob. Ic. 385. f. 1. *Chamæpitys spuria altera*; Ger. Em. 526; the left-hand figure in Dod. Pempt. 47; all from the same wooden block; appears to us a different species from the above-described, with which we are unacquainted. There can be no doubt that the *T. mauritanum*, Linn. Sp. Pl. 787, entirely adopted from Shaw's rude figure, n. 575 of his Phyt. Afric. Specimen, is exactly the same with the real *Pseudo-chamæpitys* of Linnæus, which we have from Spain and Barbary, and which the cut of Camerarius, as well as the right-hand one of Dodonæus, clearly represents.

All the foregoing species, with a few more which may be found in Linnæus and Willdenow, apparently constitute a section of the genus before us, whose deeply-divided *foliage* gives them a peculiar and striking character. Their *inflorescence* nevertheless differs considerably, and on a more careful examination it will be found, that the racemose blue-flowered ones are most naturally akin to the *T. fruticans*, notwithstanding its undivided entire *leaves*; while the others are more related to some cut-leaved red-flowered species, with which we shall meet hereafter; inasmuch that no natural subdivision of this genus could be founded on the above character.

*T. fruticans.* Blue Tree Germander. Linn. Sp. Pl. 787. Willd. n. 9. Ait. n. 6. Sm. Fl. Græc. Sibth. t. 527, unpublished. (*T. latifolium*; Linn. Sp. Pl. 788. Curt. Mag. t. 245. *T. fruticans bæticum*; Clus. Hist. v. 1. 348. Dill. Elth. 379. t. 284. *T. bæticum*; Ger. Em. 659.)—Leaves ovate-lanceolate, entire; snow-white and cottony beneath. Flowers axillary, solitary. Segments of the *calyx* ovate, cottony at the back.—Native of the south of Europe and north of Africa. A hardy and common greenhouse plant in England, sometimes bearing our milder winters in the open air, especially near the sea. The *stem* is shrubby, bushy, three or four feet high, with straight, divaricated *branches*, clothed, like the backs of the *leaves* and *calyx*, as well as all the *stalks*, with peculiarly white, soft, dense down. The *leaves* vary in size and breadth, as may be seen in the plate of Dillenius, whose fig. 368. misled Linnæus to make a species, by the name of *latifolium*, which is but a trifling variety. The upper surface of the *leaves*, and inside of the *calyx*, are dark-green, usually quite smooth. *Flowers* large and handsome, of a fine blue, coming out at all times of the year: the middle segment of their lower lip sometimes deeply cloven.

*T. brevifolium.* Short Hyssop-leaved Germander. Schreb. Vertic. Unilab. 27. Willd. n. 10. Sm. Fl. Græc. Sibth. t. 528, unpublished. (*Rosmarinum stœchadis facie*; Alpin. Exot.

103. t. 102. *Polio retto di Candia*; Pon. Bald. 156.)—Leaves lanceolate, revolute, entire, obtuse, hoary. Flowers solitary. Calyx without awns.—Native of rocks in Crete, near the sea-shore. The *stem* is shrubby, with copious spreading, square, leafy branches. *Leaves* about an inch long, of a hoary green on both sides, veiny. *Flowers* on slender, solitary, simple stalks, from the bosoms of the upper leaves. *Corolla* bluish-coloured, with purple veins. Segments of the *calyx* revolute and blunt. Schreber and Willdenow cite, under this species, *T. frutescens*, *stœchadis arabicæ folio et facie*; Tourn. Cor. 14. Rivin. Monop. t. 20; which is correct as to Tournefort, but no such thing occurs in Rivinus. If we had not consulted, in Sir Joseph Banks's library, the most perfect copy of his work known to exist, we should not speak so decidedly on this head.

*T. creticum.* Rosemary-leaved Germander. Linn. Sp. Pl. 788. Willd. n. 11. Sm. Fl. Græc. Sibth. t. 529, unpublished. (*T. hyssopifolium*; Schreb. Vertic. Unilab. 28.)—Leaves linear-lanceolate, revolute, entire, obtuse; white and cottony beneath. Flowers often two or three together. Calyx cottony, spinous.—Native of Crete, Cyprus, and Egypt. A taller, larger *shrub* than the last, some of whose synonyms were confounded with it by Linnæus. Its habit and foliage much resemble Rosemary. The *flowers* are light purple, or pink, and form long leafy *chyslers*, at the ends of the *branches*, being either solitary, or two or three together, on short downy *stalks*, from the bosoms of the upper *leaves*. The *calyx* is cottony without; green within; and has short spinous points.

*T. Marum.* Marum Germander, or Cat-thyme. Linn. Sp. Pl. 788. Willd. n. 12. Ait. n. 7. (*Pseudo-Marum*; Rivin. Monop. Irr. t. 13, not t. 40, which is *Thymus Maf-tichina*. Marum Cortusi; Bauh. Hist. v. 3. 242.)—Leaves ovate, acute, entire, stalked, cottony beneath. Flowers racemose, in pairs, turned one way. Calyx woolly.—Native of Spain, and the isles of Hyeres. Frequent in greenhouses, where it is very hardy, being cultivated for the sake of its peculiarly pungent scent, which powerfully induces sneezing, and which renders it not less grateful to cats than Valerian. The *stem* is bushy, of humble growth, with round hoary branches. *Leaves* a quarter of an inch long, of a hoary green on the upper side. *Flowers* crimson.

*T. quadratum.* Little Square-leaved Germander. Schreb. Vertic. Unilab. 36. Willd. n. 13. Sm. Fl. Græc. Sibth. t. 530, unpublished. (*T. ramosissimum*; Desfont. Atlant. v. 2. 4. t. 118.)—Leaves obovate-rhomboid, deeply toothed; cottony beneath. Flowers axillary, solitary, deflexed. Calyx woolly.—Native of fissures of rocks, in Spain, Barbary, and Crete. A small, decumbent, branching *shrub*, whose *leaves* are not half an inch long; green above; white beneath. *Flowers* pink, their *calyx* bent down, so as to make a right angle with its *footstalk*, and then recurved. Segments of the upper lip of the *corolla* advanced towards those of the lower in a remarkable degree. *Style* reflexed.

*T. Laxmanni.* Laxmann's Germander. Linn. Syft. Veg. ed. 13. 439. Willd. n. 16. Ait. n. 10. Marfch. von Bieberst. Taur. v. 2. 35. "Waldst. and Kitzeb. Hung. v. 1. 71. t. 69."—Leaves elliptic-oblong, villous, ribbed, nearly entire. Flowers axillary, solitary, opposite, turned one way.—Native of Siberia, Hungary, &c. We notice this species here merely to express our concurrence with the opinion of the able author of the Flora Taurico-Caucasica above cited, that it certainly belongs to *Ajuga*, as well as the *T. salicifolium*, Linn. Mant. 80, already referred thither by Schreber and Willdenow. The two species are very nearly akin, and answer in character and habit entirely to *Ajuga*, and not to *Teucrium*.

*T. Ardwni.*

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*T. Arduini.* Arduino's Germander. Linn. Mant. 81. Willd. n. 20. Sm. Fl. Græc. Sibth. t. 531, unpublished. (*T. foliis ovato-crenatis, subhirsutis, petiolatis, caulibus spicâ flavescente pilosâ terminatis*; Arduin. Spec. 1. 12. t. 3. *Scutellaria cretica*; Linn. Sp. Pl. 836. Willd. Sp. Pl. v. 3. 176. Ait. Hort. Kew. v. 3. 429. *Cassida cretica fruticosa, catarixæ folio, flore albo*; Tourn. Cor. 11.)—Leaves ovate, ferrated, hairy. Clusters densely imbricated, cylindrical, with linear bractæas, longer than the flowers. Upper segment of the calyx dilated, heart-shaped; two lowest setaceous.—Native of Crete, and of the shady woods of the Bithynian Olympus. It appears to have been cultivated by Miller in 1729. Although Linnæus, in referring this plant, after Tournefort, to *Scutellaria*, perceived it to be a *Teucrium*, neither he nor any one else, till lately, suspected it to be described twice over in his works. This we discovered by a comparison of original specimens. The stem is herbaceous, not shrubby, square, cross-branched, leafy, rough with spreading hairs. Leaves stalked, not unlike those of Balm in size, form, and colour. Clusters from one to four inches long, near an inch in diameter, solitary at the ends of the branches, erect, of innumerable crowded white flowers. The calyx is hairy, suddenly bent downwards at its taper base, then horizontal, its border very unequally five-cleft; the upper segment broad, as in *Scutellaria*, reflexed at the sides, tipped with a bristle; two next short, triangular; two lowest long, narrow, with pungent points.

*T. canadense.* Nettle-leaved Hoary Germander. Linn. Sp. Pl. 789. Willd. n. 21. Ait. n. 13. Pursh n. 1. (*Chamædrys canadensis, urticæ folio, subtus incano*; Tourn. Inst. 205.)—Leaves ovato-lanceolate, stalked, sharply ferrated, downy on both sides; hoary beneath. Cluster terminal, dense, somewhat whorled. Bractæas ovate, shorter than the flowers. Segments of the calyx nearly equal.—In low grounds, on the borders of ponds and lakes, from Canada to New York, perennial, flowering in July and August. The habit of the leaves and inflorescence is like that of some spiked *Veronica*. At the insertion of each pair of footstalks, the stem is furrowed with a ring of prominent hairs. The calyx is bell-shaped, with five broad, nearly equal, segments. Corolla purple.

*T. virginicum.* Virginian Germander. Linn. Sp. Pl. 789. Willd. n. 22. Ait. n. 14. Pursh n. 2. "Schkuhr Handb. t. 160." (*T. virginianum melissophyllum, floribus cæruleis*; Pluk. Almag. 363. Phyt. t. 318. f. 1; with a very faulty representation of the corolla.)—Leaves ovate-oblong, ferrated, downy; the upper ones sessile. Spikes crowded, whorled. Bractæas the length of the calyx.—In low grounds and bogs, from New York to Carolina, perennial, flowering from June to August. It very much resembles the last. Pursh.—Miller is said to have cultivated both these North American species in 1768. We have seen only the former.

*T. abutiloides.* Mulberry-leaved Germander. L'Herit. Stirp. v. 1. 84. Willd. n. 27. Ait. n. 17. Jacq. Hort. Schoenbr. v. 3. 58. t. 358.—Leaves heart-shaped, acute, crenate, downy. Clusters axillary, not longer than the footstalks.—Discovered by Mr. Masson in Madeira, from whence it was brought to Kew, in 1777. It flowers in the greenhouse in April and May, and is conspicuous for the large size of its leaves, four or five inches long, on densely downy footstalks, half that length. The flowers are no less remarkable for their golden hue, and their situation in dense, solitary, lateral, stalked clusters, which rarely equal the footstalks in length.

*T. Scordonia.* Wood Germander, or Wood Sage. Linn. Sp. Pl. 789. Willd. n. 28. Fl. Brit. n. 1. Engl. Bot. 1. 1543. Curt. Lond. fasc. 5. t. 40. Fl. Dan. t. 485.

(*Scorodonia*; Rivin. Monop. Irr. t. 12. S. five *Salvia agrestis*; Ger. Em. 662.)—Leaves heart-shaped, ferrated, stalked, hairy. Stem erect. Flowers leaning to one side, in lateral and terminal clusters.—Very common in dry heathy ground, and sandy woods, throughout Europe, from Norway to Greece, flowering in July and August. Linnæus seems to have recollected this plant with delight in the fields of Hartecamp, where the garden of his friend Clifford had been to him a real paradise. The root is creeping and perennial. Herb a foot or two in height, dark green, hairy, bitter, with a strong scent like hops, for which it is said to be not a bad substitute in brewing. We wish nothing worse had ever been used. The long aggregate clusters of flowers are rendered conspicuous by the contrast of the pale yellow corolla and purple stamens. The upper segment of the calyx approaches in form and breadth to what we have pointed out as so remarkable in *T. Arduini*.

*T. betonicum.* Hoary Germander. Ait. ed. 1. v. 2. 279. ed. 2. n. 19. Willd. n. 30. L'Herit. Stirp. v. 1. 83. t. 40. Curt. Mag. t. 1114. (*T. betonicæ folium*; Jacq. Coll. v. 1. 145. t. 17. f. 2.)—Leaves ovato-lanceolate, bluntly ferrated, stalked, soft and downy; hoary beneath. Stem shrubby. Clusters aggregate, terminal. Bractæas lanceolate, entire. Native of Madeira. A very handsome greenhouse shrub, introduced by sir Joseph Banks, in 1775, flowering most part of the summer, and easily propagated by cuttings. The crimson flowers are elegantly contrasted with the hoariness of the herbage; the upper surface of the leaves being greener than the rest. The segments of the upper lip of the corolla being broader and blunter than usual, some doubts have been started whether this species belonged to *Teucrium* or to *Ajuga*, or whether these genera were really distinct. To this we would answer, that the habit of the latter is peculiar, and its essential character no less clear, consisting in a short notched upper lip, instead of the remotely-lobed one of *Teucrium*. We believe moreover that the central lobe of the lower lip is always divided and divaricated in *Ajuga*.

*T. massiliense.* Apple-scented Germander. Linn. Sp. Pl. 789. Willd. n. 32. Ait. n. 21. Jacq. Hort. Vind. v. 1. 41. t. 94. (*T. n. 6*; Gerard. Gallopr. 277. t. 11.)—Leaves ovate, rugged, hoary, strongly crenate. Stem erect. Flowers turned to one side, in lateral and terminal, upright clusters.—Native of the isles of Hyeres, but scarcely known in any other country, nor is it often to be seen in gardens. The stems are a foot high. Leaves stalked, bluntish, hardly an inch long. Flowers small, light crimson. Upper segment of the calyx broad-ovate. The whole herb is clothed with a hoary, soft, velvet-like pubescence, and when touched exhales a very powerful and peculiar scent, like mellow apples, and therefore, to many people, not agreeable, though combined with a spicy fragrance. Gerard's plate, like the others in his book, is very finely executed.

*T. Scordium.* Water Germander. Linn. Sp. Pl. 790. Willd. n. 34. Fl. Brit. n. 2. Engl. Bot. t. 828. Woody. Med. Bot. t. 57. Fl. Dan. t. 593. (*Scordium*; Rivin. Monop. Irr. t. 11. Ger. Em. 661.)—Leaves oblong, sessile, with tooth-like serratures. Flowers axillary, stalked, in pairs. Stem procumbent.—Native of marshy places in various parts of Europe, but rare in England, except in the Isle of Ely. It appears to be the true *σκορδίου* of Dioscorides, retaining a similar appellation, among the modern Greeks, and occurring, as Dr. Sibthorp observed, in Crete, Zante, and Asia Minor. The root is perennial and creeping. Herb decumbent or prostrate, hairy, and somewhat hoary, very bitter, with a strong, unpleasant, garlic-like scent. Flowers pale purple, in opposite pairs, from the bosoms of most of

the *leaves*. This herb has formerly been celebrated for its deobstruent and tonic qualities, but is now out of medical use, except perhaps in the recesses of the country.

*T. scordioides* of Schreber, Willd. n. 35, seems to us, without doubt, a variety of the last, as it is made in Prodr. Fl. Græc. v. 1. 393.

*T. Chamædrys*. Wall Germander. Linn. Sp. Pl. 790. Willd. n. 36. Fl. Brit. n. 3. Engl. Bot. t. 680. Woodv. Suppl. t. 243. (Chamædrys; Rivin. Monop. Irr. t. 10. f. 2. Tourn. Inf. t. 97; a much better figure. C. major latifolia; Ger. Em. 656.)—Leaves nearly ovate, stalked, deeply crenate. Flowers axillary, three together, stalked. Stem round, hairy.—Found on dry rocks and old walls in the more temperate or warm countries of Europe. It is abundant on the old city wall, on the north side of Norwich, as well as here and there in other parts of England, but not universally. Dr. Sibthorp observed the plant in dry stony places, throughout Greece and the isles of the Archipelago, where it still retains nearly the same appellation of *χαμαίδρυς*, recorded in Dioscorides. It flowers in July and August, and has a perennial creeping root. The stem is bushy, rather diffuse, and slightly shrubby, a span high. Leaves of a full shining green, slightly hairy, deeply crenate and cut. Flowers crimson, numerous, more handsome than those of *T. Scordium*, with which species the present has been supposed nearly to agree in virtues. It is equally bitter, but more agreeably, though less powerfully, scented.

*T. lucidum*. Shining Germander. Linn. Sp. Pl. 790. Willd. n. 39. Ait. n. 25. Sm. Fl. Græc. Sibth. t. 532, unpubl. (Chamædrys alpina frutescens, folio splendente; Tourn. Inf. 205. Magnol. Hort. 52. t. 9.)—Leaves ovate, stalked, deeply crenate, smooth and shining. Flowers axillary, three together, stalked. Stem square, erect, nearly smooth.—Native of alpine vallies in Savoy and Provence. Found by Dr. Sibthorp on Parnassus, and other Grecian mountains, as well as in the island of Cyprus. The tall, erect, square stems, often quite smooth; numerous whorls of large crimson flowers; and shining leaves, of which the upper or floral ones are more numerous quite entire; all render this plant, at first sight, decidedly different from the last, and yet they are very nearly related, so that an essential difference is difficult to seize, and perhaps none that has yet been indicated is invariably constant.

*T. flavum*. Yellow Shrubby Germander. Linn. Sp. Pl. 791. Willd. n. 41. Ait. n. 26. Sm. Fl. Græc. Sibth. t. 533, unpubl. (Teucrium; Rivin. Monop. Irr. t. 10. f. 1. Chamædrys frutescens major, floribus ochroleucis; Morif. sect. 11. t. 22. f. 1.)—Leaves ovate, crenate, downy. Whorls six-flowered, composing terminal clusters, with ovate, concave, entire bractæas. Stem shrubby, downy.—Native of rocks and old walls, in the south of Europe, and north of Africa; abundant in the Archipelago, and on the walls of Rome. The stem is woody, branched, erect, about two feet high; its branches leafy, bluntly quadrangular, clothed with very soft, velvet-like, curved pubescence, as is the whole of the herbage. Leaves stalked, hardly an inch long; tapering and entire at the base. Flowers pale yellow, composing long, whorled, erect clusters, with pale-green bractæas, about equal to the calyx. The teeth of the latter are nearly equal. Upper segments of the corolla edged with red.

*T. bicolor*. Two-coloured Chili Germander. (*T. heterophyllum*; Cavan. Ic. v. 6. 56. t. 577.)—Leaves wedge-shaped, obtuse; undivided or cut. Flowers axillary, solitary. Calyx nearly regular, with ten strong ribs.—Gathered by Louis Née, in the neighbourhood of Talcahuano, in Chili, flowering in November and December. We have

a wild specimen from the late abbé Cavanilles, whose specific name we are obliged to change, there being already a *T. heterophyllum*, Willd. n. 37. The stem is shrubby, almost six feet high, with square leafy branches, clothed, like the calyx, stalks, and under side of the foliage, with very short dense pubescence. The leaves are about an inch long, nearly smooth on the upper side, various in breadth; the broadest deeply and coarsely cut; the rest undivided and entire; the lower ones on short stalks; the upper sessile. Flowers from the bosoms of the upper leaves, on shortish, round, finely downy stalks. Calyx cut almost half way down into five, nearly equal, acute, ovato-lanceolate segments, each with a strong mid-rib; its tube having five intermediate ribs besides. Corolla externally hairy, white, the middle of its lower lip of a violet red.

*T. montanum*. Dwarf Mountain Germander. Linn. Sp. Pl. 791. Willd. n. 42. Ait. n. 27. Sm. Fl. Græc. Sibth. t. 534, unpublished. (*Ajuga folio integro*; Rivin. Monop. Irr. t. 15. Polium septimum; Clus. Hist. v. 1. 363. f. 1, 2. P. lavandulæ folio; Ger. Em. 655. f. 2, 3.)  
β. *T. supinum*. Linn. Sp. Pl. 791. Willd. n. 43. Ait. n. 28. Jacq. Auftr. t. 417. (*P. montanum octavum*; Clus. Hist. v. 1. 363. P. montanum minimum; Ger. Em. 655.)

Corymbs terminal. Leaves linear-lanceolate, somewhat revolute, almost entire; cottony beneath. Calyx reticulated, ten-ribbed, slightly downy, with spinous teeth.—Native of dry mountainous or alpine situations, in Germany, Switzerland, France, Spain, and Greece; sometimes, though rarely, preserved in pots, under a frame, in our more curious gardens. A dwarf bushy shrub, like Thyme, with a strong woody root, and many diffuse, downy, leafy stems. Leaves crowded, opposite, stalked, hardly an inch long, very rarely notched, various in breadth; green, convex, and nearly smooth, above; veiny, very white and cottony, beneath. Flowers in dense, sessile, solitary corymbs. Calyx tubular, pale, with equal, spreading, tapering, pungent teeth, from whose intermediate sinuses the veins spread star-wise. Corolla pale buff-coloured, the segments of its upper lip veined with red.

Schreber has long ago united *T. montanum* and *supinum*; nor was Linnæus ignorant of their near affinity; though in this instance, as in every thing relative to alpine plants of the south of Europe, which he had rarely examined alive, he was disposed to give up his own opinion, to that of practical observers. Clusius having represented *T. supinum* so different in size and habit from *montanum*, might help to mislead following botanists; but in truth they hardly deserve to be distinguished as varieties, *supinum* being only rather less luxuriant, with narrower leaves, which indeed vary on the very same root. The species before us has lent a specific name to some other plants, as *Andromeda polifolia* of Linnæus, and *Menziesia polifolia* of Jussieu, which have no similitude to the true ancient *Polium* hereafter described, but greatly resemble this.

*T. pyrenaicum*. Pyrenean Germander. Linn. Sp. Pl. 791. Willd. n. 45. Ait. n. 29.—Corymbs terminal. Leaves orbicular, crenate, hairy; entire and slightly wedge-shaped at the base. Calyx-teeth tapering, fringed.—Native of the Pyrenées. Cultivated by Miller in 1731, at Chelsea garden, where we have seen it a few years since, yet there seems to be no certain figure of this beautiful plant extant. Its habit is somewhat like the last, but the leaves totally different, being almost orbicular, and from half an inch to an inch in diameter, flat, green, veiny and hairy. Flowers in dense convex tufts, variegated with pale yellow and purple; the ribs and teeth of the calyx fringed with long bristly hairs.

Whether

Whether Schreber's *T. rotundifolium*, Willd. n. 46, to which the figures of Boecone and Barrelier, cited for the former, are said to belong, be more than a variety, we have no means of determining.

*T. Polium*. White Poley Germander. Linn. Sp. Pl. 792. Willd. n. 52. Ait. n. 31. Sm. Fl. Græc. Sibth. t. 535, unpublished. (*T. Teuthrion*; Schreb. Unilab. 46. *Polium montanum*; Ger. Em. 653, 654. *P. montanum album ferratum*, &c.; Barrel. Ic. t. 1074.)—Heads roundish, leafy. Leaves sessile, oblong, obtuse, convex, bluntly crenate, densely woolly. Calyx very woolly, obtuse, pointless.—Native of mountains in Italy, Spain, and the south of France; very common in Greece, the Archipelago, and throughout the Levant; rarely seen in our gardens, being impatient of wet. The root is woody and very strong. Stems numerous, a span long, ascending, erect, or partly decumbent, round, clothed, like the rest of the herbage, with extremely soft, white, woolly down. Leaves numerous, opposite, half an inch or an inch long, thick and woolly, their edges remarkably deflexed, with strong, round, recurved teeth; the base slightly wedge-shaped, scarcely stalked. Flowers numerous, in dense, sessile, terminal, often aggregate, heads, or short spikes, intermixed with leaves; the lower heads usually stalked. Calyx very woolly and obtuse. Corolla white, with a yellow palate.

Schreber, who is followed by Willdenow, makes numerous species out of the reputed varieties of this plant, of which we are unable, for want of sufficient means of examination, to form an opinion. The characters given do not satisfy us, nor do the specimens we have seen afford better.

The most striking of the whole is *T. aureum*, Schreb. Unilab. 43. Willd. n. 48. Ait. n. 30. Cavan. Ic. v. 2. 16. t. 17, remarkable for the golden tint on its heads and upper leaves. This has usually a solitary head or spike, and perhaps the calyx-teeth are more slender and acute than in the common *T. Polium*, which merits inquiry. On the other hand, *T. capitatum*, which we shall next describe, approaches nearly to some of the above-mentioned varieties, so that perhaps they ought to be referred to it, rather than to *Polium*.

*T. capitatum*. Purple Poley Germander. Linn. Sp. Pl. 792. Willd. n. 56. Ait. n. 32. Cavan. Ic. v. 2. 17. t. 119. Sm. Fl. Græc. Sibth. t. 536, unpublished. (*Polium monspessulanum*; Bauh. Hist. v. 3. 299.)—Heads roundish, leafy, lateral and terminal, stalked. Stem cross-branched. Leaves sessile, linear-oblong, obtuse, convex, crenate, hoary. Calyx woolly, oblong, obtuse, pointless.—Native of hills in Siberia, Spain, the south of France, Zante, Cyprus, and Greece. This is of a more slender habit than the last, less woolly, and more hoary, with purple flowers, a more elongated tubular calyx, and narrower leaves. The tube of the corolla also is longer, and much less bell-shaped, or inflated in the throat. It is nearly related to *T. Polium*, but surely a distinct species.

*T. cuneifolium*. Wedge-leaved Poley Germander. Sm. Prodr. Fl. Græc. Sibth. n. 1311. Fl. Græc. t. 537, unpublished.—Heads terminal, dense. Leaves rounded, deeply crenate; wedge-shaped at the base; woolly all over. Calyx blunt, pointless.—Gathered by Dr. Sibthorp, on the Spachiote mountains of Crete. The general outline of the plant answers to *T. rotundifolium*, Willd. n. 46; but that is a far less woolly plant, with a pointed calyx, and not allied to the *Polium* tribe. The present has round, trailing, shrubby, cross-branched stems, a foot or more in length. Every part of the herbage is covered with thick, white, soft, woolly or velvety down. Leaves, with their stalks, an inch long. Flowers snow-white, in aggregate terminal

heads. Calyx tubular, with short rounded teeth. Segments of the upper lip of the corolla large, as long as the stamens, which they embrace, and partly conceal. Anthers red.

*T. alpestre*. Sharp-toothed Alpine Poley Germander. Sm. Prodr. Fl. Græc. Sibth. n. 1312. Fl. Græc. t. 538, unpublished.—Flowers axillary, solitary. Leaves wedge-shaped, rounded, deeply crenate, downy. Stem tufted, much branched.—Found by Dr. Sibthorp, upon the most lofty summits of the Spachiote mountains of Crete. The root is woody, dividing at the crown into innumerable strong, woody, depressed stems, which bear a dense tuft of ascending, leafy, downy branches, hardly a finger's length. Leaves stalked, greyish, about half an inch long, obtuse. Flowers opposite, on short stalks, from the bosoms of two or three of the uppermost pair of leaves. Calyx tubular, finely downy. Tube, throat, and upper lip of the corolla, pale yellow; lower lip white, its middle segment deeply concave.

*T. pumilum*. Rosemary-leaved Poley Germander. Linn. Sp. Pl. 792. Willd. n. 61. (*Polium montanum pumilum rubrum*; Barrel. Ic. t. 1092, 1093.)—Heads terminal, solitary, sessile, leafy. Leaves crowded, sessile, linear, revolute, smooth; downy beneath. Stems ascending, woolly. Calyx pointed.—Native of hills in Spain, flowering in July and August.—From the woody perennial root, spring several, more or less erect, simple or branched, leafy stems, three or four inches long, clothed with dense, soft, white wool. The leaves are hardly an inch long, crowded and somewhat imbricated, in four rows, narrow, strongly revolute, obtuse; convex, green and polished on the upper side; concave, with a downy rib, just visible beneath. Calyx ribbed, downy, with short, thick, spinous points. Tube of the corolla slender, downy, as well as the outside of the limb.

We are quite unable to imagine how *T. Libanitis* of Schreber, Willd. n. 60. Cavan. Ic. v. 2. 17. t. 118, came to be distinguished from *pumilum*, as there does not appear to be the least difference between them, except the stem of *Libanitis* being more erect; but that circumstance is evidently variable. *T. verticillatum*, Cavan. t. 198. Willd. n. 59, seems also but a variety; though we presume not to determine this without seeing a specimen.

*T. spinosum*. Thorny Germander. Linn. Sp. Pl. 793. Willd. n. 64. Ait. n. 33. Sm. Fl. Græc. Sibth. t. 539, unpublished. (*Chamædryas spinosa*; Bauh. Prodr. 117. *Scordium spinosum odoratum*; Cornut. Canad. 123. t. 124. Barrel. Ic. t. 202. *S. spinosum*; Cavan. Ic. v. 1. 19. t. 31.)—Stem and branches spinous, hairy. Flowers axillary, opposite. Upper segment of the calyx ovate; the rest awl-shaped, spinous.—Native of fields and hilly places in Spain and Portugal. Dr. Sibthorp met with it in fields between Smyrna and Bursa. The root is annual. Stem branched copiously from the very bottom, about a foot high, bushy, the branches opposite, crossing each other in pairs, spreading, square, clothed with very soft prominent hairs, tipped with strong spines, and furnished with smaller lateral ones, particularly at the insertion of the leaves and flowers. Leaves sessile, deflexed, small, oblong, obtuse, notched, green, hairy. Flowers numerous, solitary or in pairs, from the bosoms of the diminished or upper leaves, each on a short, round, hairy stalk. Calyx deflexed and bent at the base, then horizontal and somewhat bell-shaped; its upper segment very broad, ribbed, spinous-pointed, erect, or rather reflexed, the four others shorter, prominent, ascending, pungent. Corolla white, with red stripes on its upper lip; the middle segment of the lower very large, slightly concave; the base of the tube globular.—The flowers are by no means reversed, *resupinati*, in Sibthorp's figure of this species, though

Læfſing ſo deſcribes them, and led Linnæus to adopt that character. His *T. mucronatum*; Sp. Pl. 793, differs in no reſpect from the *ſpinofum*, to which therefore we have transferred its ſynonyms.

TEUCRIUM, in *Gardening*, furniſhes plants of the under-ſhrubby and herbaceous kinds, among the great number of which, the ſpecies following are the moſt generally cultivated: the yellow-flowered ſhrubby germander (*T. flavum*); the ſage-leaved germander, or wood-ſage (*T. ſcorodonia*); the nettle-leaved germander (*T. canadense*); the dwarf mountain germander (*T. montanum*); the Pyrenean germander (*T. pyrenaicum*); the poley (*T. polium*); the round-headed germander (*T. capitatum*); the dwarf germander (*T. pumilum*); the narrow-leaved tree-germander (*T. fruticans*); the broad-leaved tree-germander (*T. latifolium*); the Cretan germander (*T. creticum*); and the common marum or cat-thyme (*T. marum*).

There is a variety in the firſt fort which is hairy, with yellow flowers, with pale white flowers, and with purple flowers.

In the fourth fort there is likewiſe a variety with much ſmaller leaves, which are hoary on their under ſide.

Alſo in the ſixth fort there are ſeveral varieties; as the common yellow poley, which has the ſtalks rather herbaceous and trailing, about ſix inches long, and hoary: leaves woolly, about half an inch long, ſome wedge-shaped, others oblong, ending in obtuſe points, and crenate towards their ends: the flowers collected in oblong thick ſpikes at the end of the branches, of a deep yellow colour, and appearing at the beginning of June. This grows naturally in Spain. The narrow-leaved yellow poley, which has woody ſtalks, erect, branching, and covered with a hoary down, riſing ſix or eight inches high; the leaves linear, woolly, about half an inch long, having ſometimes two or three ſlight indentures on their edges; the flowers collected in roundiſh ſpikes at the end of the branches; they are bright yellow, have woolly calyces, and appear in June and July. It grows naturally in Spain and Portugal. The white poley, which has the ſtems a foot long, and trailing: the leaves are a little cottony, entire on the ſides, but toothed at the end: the flowers are pretty large, white, tinged a little with purple. It is a native of the ſouth of France. There is alſo the purple poley.

And there is a variety in the ſeventh fort which has an erect branching ſtalk, that riſes a foot high; the lower part becomes woody, but the upper is herbaceous: the leaves are linear-lanceolate, about an inch long, crenate, of a pretty thick confiſtence, and a little woolly: the flowers collected in a corymb at the end of the branches, white, appearing in July and Auguſt.

The ninth contains a variety which is a little more branched, and has ſmaller ſhorter leaves: the flowers are paler, the ſtamens ſomewhat longer, the anthers ſmaller and brown; whereas in the larger fort they are violet: and another with variegated leaves.

*Method of Culture.*—All the herbaceous and ligneous kinds may be readily increaſed by parting the roots, by ſlips of the young branches, and ſeeds: the roots may be divided in the autumn, or early ſpring, and the ſlips of the branches be taken off in the ſpring and ſummer, being planted out in moiſt ſhady ſituations, and well rooted, they may be removed to where they are to remain, though it is beſt to plant them at once where they are to grow: the ſeeds may be ſown in a bed or border of common earth in the early ſpring ſeaſon.

But in the polium kinds, the ſeeds ſhould be ſown in a bed of light earth, and the plants be either put out in nurſery-

rows, or ſet where they are to remain, in the latter end of ſummer.

The ſhrubby forts may likewiſe be increaſed by ſlips or cuttings of the young ſhoots of the branches, which ſhould be planted in pots filled with light mould, in the ſpring and ſummer months, in order to be removed under the protection of the greenhouſe in winter, being afterwards managed as other greenhouſe exotics.

Theſe plants are all of the perennial kind, and ſome of them are durable in the ſtems and branches for ſeveral years.

The firſt forts afford variety in the borders, &c. and the latter in aſſemblage with greenhouſe plants.

TEUDERIUM, in *Ancient Geography*, a town of Germany, in the vicinity of Bogadium and Mediolanium. Ptolemy.

TEVENDEZ, in *Geography*, a mountain in the S.E. part of Fez; being part of the Atlas.

TEVERONE, a river of Italy, which joins the Tiber near Rome.

TEVESAR, a town on the W. coaſt of the iſland of Celebes. S. lat. 2° 2'. E. long. 119° 21'.

TEUFFEL'S BRUCK, or *Devil's Bridge*, a bridge over the Reufs, formed of a ſingle arch, about twenty-two feet radius, ſupported by two rocky peaks, nearly perpendicular, between which the river runs at the depth of ſome hundred feet; 3 miles from Urſeren.

TEUFFEN, a town of Switzerland, in the canton of Appenzel; 6 miles N.W. of Appenzel.

TEUFING, or TAUZIM, a town of Bohemia, in the circle of Pilſen; 22 miles N.W. of Pilſen. N. lat. 50° 2'. E. long. 13° 5'.

TEUGA, in *Botany*, the name given in the Hortus Malabaricus to a genus of plants, called by Linnæus and others *coccus*.

TEUGLASSA, in *Ancient Geography*, an iſland which Thucydides ſeems to place on the coaſt of Aſia Minor, in the neighbourhood of the Doride.

TEVIN, in *Geography*, a town of Perſian Armenia, on a ſmall river which runs into the Aras; 15 miles S.E. of Erivan.

TEUKE, a town of Perſia, in the province of Khorraſſan; 32 miles E. of Tabas-kileki.

TEUMES, in *Ancient Geography*, a river of Greece, in Bœotia, which watered the town of Thebes, according to Heſychius.

TEUMESSUS, a borough of Bœotia, upon a mountain E. of Thebes, and near a ſmall river called Thermodon. Here was a temple of Diana Telchinia. It was notorious for the ſuperſtitious credulity of its inhabitants.—Alſo, a mountain of Greece, in Bœotia.

TEVO, ZACCARIA, in *Biography*, author of an ample treatiſe on muſic, written in Italian, and published at Venice, in ſmall quarto, 1706, entitled “*Il Muſico Teſtore*;” (*teſtore* literally means a weaver; but metaphorically, a compoſer, an author;) the muſician's *text*, or guide. The work is divided into four parts, twenty chapters in each, the titles of which are very promiſing; but his ſtyle is not very pleaſant, nor are his definitions or inſtructions very ſatisfactory. The author had read much, but his digeſtion was not ſo good as his appetite. He ſwallowed, without due maſtication, all the old ſtories about the invention and miraculous powers of muſic. He aſſigns to Orpheus, the ſon of Apollo, the invention of the violin, and to Sappho that of the bow; aſſuring us that ſhe was the firſt who uſed it in the preſent manner! He not only finds the inventor of every ſpecies

species of instrument, but the time when and place where it was first constructed. There is little science, and still less ingenuity, in the examples of composition given in illustration of the rules of counterpoint: so that if the young student, who peruses this work for instruction, is not a conjurer before he begins the task, he will not be made one by the mysteries which it unfolds.

Yet with patient perseverance, a young student who has little leisure, and few books to read, may become superficially learned with little trouble by this book. Tevo quotes authority for all that he advances; but his authorities are not always good, nor does he distinguish good from bad. Several obscure and even contemptible authors are quoted in the same solemn manner as the best. But in citing so many writers indiscriminately, the chief part are now so scarce and difficult to be found, that in search of them all the great libraries of Europe may be visited in vain. To save the student's time, and form his taste in literature, as well as judgment in music, the author should have quoted none but writers of the first authority, or have told his young readers what stress was to be laid on the rest.

But since the time of Tevo, so many better authorities in composition and didactic works, both on the theory and practice of music, have appeared, that we can hardly recommend the "Musico Testore" to the perusal of any but those who have much time to spare, who read every thing, and are curious to know the history and state of the art at every period of time.

TEUOCHIS, in *Ancient Geography*, a lake and town of Egypt.

TEVOEN-SOUSON, in *Geography*, a town of Chinese Tartary; 12 miles N.W. of Teldom.

TEUPITZ, a town of Brandenburg, in the Middle Mark, on a lake; 20 miles S. of Berlin. N. lat.  $52^{\circ} 5'$ . E. long.  $13^{\circ} 30'$ .

TEURERT, or TEVRERT, a town of Fez, on the borders of Algiers; 40 miles E.N.E. of Teza. N. lat.  $34^{\circ} 2'$ . W. long.  $3^{\circ} 30'$ .

TEURISCI, in *Ancient Geography*, a people placed by Ptolemy in the northern part of Dacia, between the Anerti and the Cistoboci.

TEURISTÆ, a people of Germany, placed by Strabo in the vicinity of the Danube and the Alps.

TEURNIA, a town of Norica, S. of the Danube, between Virunum and Idunum. Ptol. and Plin.

TEURTEVILLE, in *Geography*, a town of France, in the department of the Channel; 6 miles N. of Valognes.

TEUSCHNITZ, a town of Bavaria, in the bishopric of Bamberg; 34 miles N.E. of Bamberg. N. lat.  $50^{\circ} 23'$ . E. long.  $11^{\circ} 30'$ .

TEUSHANUSHSOUGGOGHTA, an Indian town of Pennsylvania, on the Alleghany river.

TEUTATES, in *Mythology*, a name or attribute of the Supreme Being, which was worshipped by the Gauls and Britons as a particular divinity. It is evidently compounded of the two British words "Deu-tatt," which signify God the parent or creator, a name properly due only to the one true God, who was originally intended by that name. Thus Lucan, l. i. v. 445.

"Et quibus immitis placetur sanguine divo  
Teutates; horranque feris altaribus Hesus."

When these ancient nations sunk into idolatry, they degraded Teutates into the sovereign of the infernal world, the same with the Dis and Pluto of the Greeks and Romans (or, as others think, with Mercury); and worshipped

him in such a manner as could be agreeable to none but an infernal power.

TEUTHEA, in *Ancient Geography*, a considerable town of the Peloponnesus, in Achaia, W. of Tritæa.

TEUTHIS, a town of the Peloponnesus, in Arcadia, in which were a temple of Venus, and another of Diana.

TEUTIUS, in the Linnæan system of *Ichthyology*, a genus of the abdominal fishes; the characters of which are, that the head is a little truncated on the fore-part; that the branchiostegæ membrane has five rays; and that the teeth are equal, rigid, and near each other, and forming a regular chain. Linnæus and Gmelin mention two species; viz. *hepatus*, and *javus* or *java*. This genus is now annulled, and the species are transferred to *Acanthurus* and *Chætodon*.

HEPATUS; *Acanthurus* Teuthis; Blue *Acanthurus*. With the middle of the body paler, and a spine on each side of the tail. This is a native of the Indian and American seas, ten or twelve inches long, or more; resembling in shape the chætodons, the head sloping in front from the origin of the dorsal fin; the colour, when recent, a deep or blackish-blue; on each side of the body is a very large, oblong-ovate whitish patch or spot, surrounded by a border of a deeper cast; the skin is roughened by very small scales; the tail is slightly lunated, dusky on the upper and lower part, and marked towards the base by a whitish ovate spot; the teeth are crenated; and on each side of the base of the tail is a very strong spine, capable of elevation at the animal's pleasure, to an horizontal direction, from the channel in which it lies. The fish figured by Catesby in his *Natural History of Carolina*, under the name of *Teng*, is supposed to be this species.

JAVA or JAVUS; *Chætodon* Guttatus. Whitish-grey, with oblong body, sprinkled with very numerous, round, rufous spots; length about ten or twelve inches; colour grey, with a dusky tinge on the upper parts, and every where sprinkled, except on the head, pectoral, ventral, dorsal and anal fins, with numerous, small, round, rufous spots; scales small, none at the bases of the fins; gill-covers smooth; dorsal and anal fin of moderate breadth; tail slightly inclining to a forked, or rather lunated shape, and speckled like the body. Native of Java. This species is supposed by Bloch and Cèpede to be the *teuthis javus* of Linnæus. But Dr. Shaw remarks, that Linnæus's description does not agree in the disposition of its colours with those of the *C. guttatus*, as it is expressly said to be marked with longitudinal streaks: so it is figured by Gronovius. See *CHÆTODON Guttatus*, changing Japan in the close of that article to Java.

TEUTHOPHACE, a word used by the ancients to express a sort of food made of beet-roots and lentils, often prescribed as a good diet for the sick.

TEUTHRANIA, in *Ancient Geography*, a town and small country of Mysia, situated towards the E., and near the source of the Caicus. Herodotus says that it was once a gulf, and it was gradually formed by the accumulation occasioned by the Caicus.

TEUTHRONA, a town of Laconia, in a small bay, on the Laconic gulf, N.E. of Pyrrhicus.

TEUTLAN, in *Geography*, a town of Mexico, in the province of Guadalajara; 50 miles N.N.W. of Guadalajara.

TEUTLEBEN, a town of Germany, in the principality of Gotha; 4 miles W. of Gotha.

TEUTONES, in *Ancient Geography*, a people of Germany, who at the time when the Romans became acquainted with them, were politically connected with the Cimbri, if they

they were not actually a tribe of the same people; and settled at no great distance from them. (See CIMBRI.) They are said to have worshipped a divinity called *Thaut*, who is supposed to have been one of their ancestors deified. The Teutones were known before the Cimbri, and uniting with them, overran the territories that were subject to the Romans; and it has been affirmed that they inhabited the banks of the *Codani Sinus*, and the island called *Codania Insula*, whence they assumed the appellation of "Codani." Pytheas of Marseilles, according to Pliny, is the first author who mentions the Teutones; and Pomponius Mela says, that their habitations were near the gulf *Codanus*. It is very probable that they extended themselves through the country that bordered on the Baltic sea; and that from thence they engaged in many warlike emigrations; transporting themselves with their arms and baggage, their wives and children, through other countries which they pillaged. It was in the year of Rome 640 that they first became known to the Romans; having advanced south of the Danube to the country called Noricum, where they were encountered by the consul C. Papirius Curfor, who obstructed their passage towards the borders of Italy. They then proceeded towards Gaul, and made their ingress among the Helvetians. Having arrived in Gallia Narbonensis, the Cimbri were there defeated by the consul Aurelius; but the Teutones made an attempt to invade Italy by the Western Alps. They were, however, resisted by Marius, and in a desperate engagement, in which the latter proved victorious, the Teutones left upon the field an almost incredible number of slain; which, including the Gauls who had fallen in a combat which took place some days before, amounted, according to historians that have not been chargeable with exaggeration, to 100,000 persons. Marius also defeated the Cimbri in Italy.

TEUTONIC, something belonging to the *Teutones*, an ancient people of Germany, inhabiting chiefly along the coast of the German ocean. See GOTHIC.

TEUTONIC *Language*, is the ancient language of Germany, which is ranked among the mother-tongues.

The Teutonic is now called the *German*, or *Dutch*, and is distinguished into *upper* and *lower*.

The *upper* has two notable dialects; viz. 1. The Scandinavian, Danish, or perhaps Gothic; to which belong the languages spoken in Denmark, Norway, Sweden, and Iceland. 2. The Saxon, to which belong the several languages of the English, Scots, Frisian, and those on the north of the Elbe.

To the *lower* belong the Low Dutch, Flemish, &c. spoken through the Netherlands, &c.

The learned Mr. Whitaker has lately, in his *History of Manchester*, controverted the opinion of those who affirm the English language to be genuine and unmixed Teutonic, and asserted it to be of Celtic origin. Mr. Drake, in his *Essay on the Origin of the English Language*, Archæol. vol. 5. has endeavoured to support the former opinion, by comparing part of Ulphila's Gothic version of the gospel of St. John, executed above 1400 years ago, with the same in our present translation, and evincing the striking affinity between the two languages; notwithstanding the different mediums through which they have descended, and the many ages that have elapsed since they have been separated. Every circumstance, he observes, that constitutes the true genius of a language, is visibly derived to the English from the Goths and Saxons. The articles, flexure of the genitive case, prepositions and auxiliary verbs, are all absolutely Teutonic. The English, he says, is clearly the natural descendant of the Gothic or Teutonic; and he challenges the deepest enquirer into the Celtic to produce so decisive a proof of

any affinity of that tongue with ours. The British, he adds, has little or no resemblance to the English. Many of their terms may have gained admission among us, as, from the vicinity and long intercourse we have had with that people, may necessarily be imagined, but their idioms and genius are as radically and essentially different as any two languages can possibly be.

TEUTONIC *Order*, a military religious order of knights, established towards the close of the twelfth century; and thus called, because it consisted principally of Germans, or Teutones.

The origin, &c. of this order were thus: the Christians, under Guy of Lusignan, laying siege to Acre, or Acon, a city of Syria, on the borders of the Holy Land; at which siege were present, Richard king of England, Philip Augustus of France, &c. some Germans of Bremen and Lubec, touched with compassion for the sick and wounded of the army, who wanted common necessaries, set on foot a kind of hospital under a tent, which they made of a ship's sail; and here betook themselves to a charitable attendance on them.

This started a thought (about the year 1190) of establishing a third military order, in imitation of the Templars, and the Hospitalers.

The design was approved by the patriarch of Jerusalem, the archbishops and bishops of the neighbouring places, the king of Jerusalem, the masters of the Temple and the Hospital, and the German lords and prelates then in the Holy Land; and, by common consent, Frederic duke of Suabia, who was then at their head, sent ambassadors to his brother Henry, king of the Romans, to solicit the pope to confirm the new order.

Calixtus III. who then governed the church, granted it by a bull of the 23d of February, 1192, and the new order was called "The Order of Teutonic Knights of the House of St. Mary of Jerusalem."

The habit of this order was a white mantle, with a black cross.

The pope granted them all the privileges of the Templars, and the Hospitalers of St. John; excepting that they were to be subject to the patriarchs, and other prelates; and that they should pay tithe of what they possessed.

The first master of the Teutonic order, Henry Walpot, elected during the time of the siege of Acre, after the taking of that city, purchased a garden, in which he built a church, and an hospital, which was the first house of the Teutonic order.

Such is the account given by Peter of Duisbourg, a priest of this order.

Jaques de Vitty differs a little from this account; and relates, that the Teutonic order was established at Jerusalem before the city of Acre was besieged.

The order made no great progress under the three first grand-masters; but under the fourth, Herman de Salza, it became very powerful; inasmuch that Conrade, duke of Mazovia and Cujavia, about the year 1230, sent an embassy to him, to solicit his friendship and assistance, offering him and his order the provinces of Culme and Livonia, with all the lands they could recover from the idolatrous Prussians, who harassed him exceedingly with their continual incursions, and against whom he intended this new militia; his own knights of the order of Christ, or of Dobrin, instituted for the like purpose, being found too weak.

De Salza accepted the donation, and Gregory IX. confirmed it; and, to aid the knights in reducing the Prussians,

fians, Innocent IV. published a croifade. With this help, in a year's time, they fubdued the provinces of Warmia, Natangia, and Barthia; the inhabitants of which renounced the worfhip of idols; and, in the courfe of fifty years more, they reduced all Pruffia, Livonia, Samogitia, and Pomerania, &c.

In 1204, duke Albert had founded the order of Sword-bearers, Port-glaives, which now became united to the Teutonic knights, and the union was approved by pope Gregory IX.

The order, thus mafters of all Pruffia, built the cities of Elbing, Marienburg, Thorn, Dantzick, Koningsberg, and fome others: the emperor Frederic II. permitted them to add to the arms of their order, the imperial eagle; and St. Louis, in 1250, allowed them to quarter the fleur-de-lis.

After the city of Acre had been recovered by the infidels, the grand-mafter of the Teutonic order removed his feat from that city to Marienburg. As the order grew in power, the knights took more ftate on them; and at length, inftead of friars, brothers, as at firft, would be called *lords*. And though the grand-mafter Conrade Zolnera, of Rotenfteine, oppofed this innovation, his fucceffor Conrade Wallerod not only approved it, but even procured himfelf to be treated with honours only rendered to the greateft princes.

Divifions being got into the order, the kings of Poland made their advantage of them: the Pruffians revolted to them: and after feveral wars between the knights and the Poles, the former yielded to king Cafimir the Upper Pruffia, and did homage to him for the Lower.

At the time of the Reformation, Albert, marquis of Brandenburg, then grand-mafter, becoming a Lutheran, renounced the dignity of grand-mafter, diffolved the commanderies, and drove the knights out of Pruffia.

Moft of the knights followed his example, and embraced the reformation: the reft transferred the feat of their order to Margentheim, or Mariendahl, in Franconia, which they ftill retain.

They there elected Walter of Cromberg their grand-mafter, formed a procefs againft Albert, and the emperor put him to the ban of the empire. The order, however, could never recover their domains; and are now little more than the fhadow of what they formerly were, having only three or four commanderies, fcarcely fufficient for the ordinary fubfiftence of the grand-mafter and his knights.

The officers of the Teutonic order, when in its fplendor, were the grand-mafter, who refided at Marienburg: under him were the grand-commander; the grand-marfhal, who had his refidence at Koningsberg; the grand-hofpitaler, who refided at Elbing; the draper, who took care to furnifh the habits; the treafurer, who lived at the court of the grand-mafter; and feveral commanders, as thofe of Thorne, Culme, Brandenburg, Koningsberg, Elbing, &c.

They had alfo their commanders of particular caftles and fortrefles; advocates, proveditors, intendants of mills, provifions, &c.

Waiffelius, in his Annals, fays they had twenty-eight commanders of cities, forty-fix of caftles, eighty-one hofpitalers, thirty-five mafters of convents, forty ftewards, thirty-feven proveditors, ninety-three mafters of mills, feven hundred brothers or knights to take the field, one hundred and fixty-two brothers of the choir, or priefts, and fix thoufand two hundred fervitors or domeftics.

TEUTSCH LEIPSH, in *Geography*, a town of Hungary 5 miles E. of Rozenberg.

TEUTSCH Pron, a town of Hungary; 10 miles N.W. of Kremnitz.

TEUTSCHDORF, a town of Hungary; 5 miles N.W. of Cafchau.

TEUTSDORF, a town of Pruffia, in the province of Oberland; 10 miles E.N.E. of Holland.

TEUVRENT, a town of Africa; 145 miles E.N.E. of Fez.

TEUW, a fmall ifland in the Eaft Indian fea. S. lat. 7° 11'. E. long. 129° 20'.

TEUXUNTA, in *Ancient Geography*, a town of Sicily, which had been built by Micythus, king of Rhegium and Zancle, according to Diodorus Siculus.

TEWANTAPAGUE, in *Geography*, a town of Mexico, in the province of Guaxaca; 135 miles E.S.E. of Guaxaca.

TEWKESBURY, anciently *Teodecheſberie*, a large and refpectable borough and market-town, in the lower divifion of the hundred of the fame name, in Gloucefterfhire, England, is fituated in the vale of Evesham, on the eaftern banks of the Avon, near its confluence with the Severn, at the diftance of 8 miles N.N.E. from Gloucefter, and 104 miles W.N.W. from London. This town was rendered famous in hiftory, from a battle fought near it, between the Yorkifts and Lancaftrians, wherein Edward IV. gave a total overthrow to Henry VI. Three thoufand of the Lancaftrians were reported to have been flain in the field, and queen Margaret, with many others, was taken prifoner. The feveral circumftances which occurred during the engagement, and the events fubfequent to the victory, are very fully related in the hiftories of England. Tewkefbury was again the feene of another action in the civil wars of Charles I. It was at different periods in poffeffion of both parties; and the final capture of it by the parliamentary forces was of great confequence as a frontier town, fecuring that fide of the county, and commanding great part of Worcefterfhire.

Tewkefbury was firft incorporated by charter in the 17th of Elizabeth, under the title of "bailiffs, burgefles, and community of the borough of Tewkefbury." Other charters were granted by James I. and James II.; the latter, in the fecond year of his reign, re-incorporated them by the name of "mayor, aldermen, and common council;" but this charter was not acted upon: and the government of the town, as a corporation, was dormant till 13 William III. when the prefent charter was obtained, under which the town is governed by twenty-four principal burgefles, who, with twenty-four affiftants, aft independent of the magiftrates of the county. From thefe are annually elected two bailiffs and four juftices, who, with the recorder, form the magiftracy of the corporation. The privilege of fending members to parliament was firft obtained 7 James I. The right of election is in the freemen and freeholders within the borough: the latter of whom have a vote generally for the county. The number of voters amount to about 500, and the bailiffs are the returning officers. The principal manufacture for the employment of the inhabitants is ftocking-frame work knitting, particularly cotton. This fupplies work for the Houfe of Industry, which is a modern building, well adapted for the purpofe of rendering the poor cleanly, moral, and induftrious. The markets, which were eftablifhed as early as the Conqueft, are held on Wednefday and Saturday: and here are feven annual fairs. The town-hall, which is a handsome edifice, was erected by fir William Codrington in 1788, at an expence of 1200*l*. The ground-floor is appropriated for holding

holding the quarter-festivals; the upper floor for a banquetting room, and for the meeting of the corporation. Among the charitable establishments are a free grammar-school, a charity-school, and several alms-houses. The Anabaptists, Quakers, Independents, and Methodists, have each a meeting-house in the town. The population, according to the returns of the year 1811, amounted to 4820; the number of houses being 1003: the latter are chiefly of brick, and principally ranged in three spacious streets. Since the year 1786, when an act was passed for paving and lighting the town, many improvements have been made; and the buildings have assumed an air of respectability.

*The Abbey.*—A monastery was first erected here, and endowed by two brothers, Oddo and Doddo, dukes of Mercia, A.D. 715, to the honour of the Blessed Virgin, which having undergone many calamities during the civil and Danish wars, about 980 became a priory, subject to Cranbourn in Dorsetshire: but Robert Fitzhamon, a noble Norman, who came to England with the Conqueror, enlarged the buildings and increased the possessions of Tewkesbury so much, that the monks of Cranbourn chose, about 1102, to remove to this place, leaving only a prior and two monks behind, and made Cranbourn in future subject to the abbey of Tewkesbury. From this time it became a great establishment of Benedictine monks; and at the suppression, the annual revenues amounted to 159*l.* 1*s.* 3*d.*, exclusive of 136*l.* 8*s.* 1*d.* granted by the convent for fees and annuities: its plate also was very valuable, the sacristy alone containing 1421 ounces. After the dissolution, the destruction of the monastic buildings was rapid and complete, through the ineffectual opposition of the monks to the visitors appointed by the king, who, in revenge, destroyed the Lady chapel, cloisters, chapter-house, and other appendages by fire. The remains of the buildings were afterwards purchased by the inhabitants: and the Abbey Church was made parochial. This magnificent structure displays an interesting example of early Norman architecture, combined with specimens of later styles, and is in other respects well calculated to arrest the attention of the antiquary. It is built in the cathedral form, and consists of a nave, choir, transept, and central tower, with the addition of several chapels, ranged round the aisle of the choir. The nave and choir are separated from the aisles by eighteen massive columns, sustaining the roof, and four substantial piers which support the tower. At the west end is a large window with a pointed arch, which appears to have been introduced within a semicircular arch in 1656. There were cloisters on the south side of the nave, where some fragments yet remain; and appear to have been highly ornamented in a similar style to those at Gloucester. The tower, according to the Abbey chronicles, was once terminated by a wooden spire, which fell down on Easter-day, 1559. The most remarkable specimens of the architecture are three tiers of arcades in the upper part; the arches of the middle tier have interesting mouldings. The length of the church is 300 feet; of the transept 120; the breadth of the choir and side-aisles is 70 feet; of the west front 100; the height from the area to the roof is 120 feet; the height of the tower 152 feet. The monuments, which are numerous, have attracted the attention of various antiquaries, particularly Mr. Gough and Mr. Lysons; the latter of whom has taken great pains in assigning the different tombs to the real persons they were intended to commemorate: many mistakes, in this respect, having been committed on traditional authority

by former writers. Near the west end of the church is the Abbey Gate-house, which appears of the age of the fifteenth century: it is embattled and ornamented with grotesque figures, projecting from a cornice; beneath which is a canopied niche between two square windows.—*Dyde's History, &c. of Tewkesbury*, 8vo. 1798. *Rudge's History of Gloucestershire*, vol. i. 1803. *Beauties of England and Wales*, vol. v. Gloucestershire; by J. Britton and E. W. Brayley.

*Tewkesbury*, called *Wamefit*, or *Parwucket*, by the Indians, a township of Massachusetts, in the county of Middlesex, containing 943 inhabitants; 24 miles N. of Boston.

*TEXALI*, in *Ancient Geography*, the inhabitants of the sea-coasts of Aberdeenshire; who had a town, called Devana, at the mouth of the river Deva (Dee), where old Aberdeen now stands.

*TEXAS*, in *Geography*, a province of New Spain, which properly forms part of Louisiana. This province is claimed by Spain as part of the internal provinces, and included in the vast intendency of San Louis Potosi: it is bounded E. by the state of Louisiana, S. by the gulf of Mexico, W. by an imaginary limit, and N. by Red river, and contains an area exceeding 100,000 square miles. The capital of this province is the garrison of San Antonio de Bejar, ridiculously called the New Philippines. It was founded in 1731, consisting of a captain, a lieutenant, and one company of soldiers. The station of Cenis in this province, is now a mere Indian village, with the ruins of a fort built by the French. That called Natchitoches, from an Indian tribe, friends of the French and enemies of the Spaniards, was a small fort, built on an island of the Red river by some French veterans. But the station of Adayes, or Adayes, is regarded by the Spanish writers as the extreme fortrefs in this quarter: it is seated in a fertile country, at the distance of two leagues from a lake of the same name, which abounds in fish, and which in some parts is five leagues in diameter, and probably ten in circumference, with a gulf which may be navigated by large vessels. In the middle of the lake is a hill, or rock, of a pyramidal form, more than 100 yards in circumference, the stone of which resembles crystal in its reflection of the solar rays, and it is the highest in the district. The vicinity abounds in wild cattle, bears and heavers; and the soil is fertile in maize and other grain. Pinkerton.

*TEXEIRA, JOSEPH (PETER)*, in *Biography*, a Portuguese historian, was born in 1543, entered among the Dominicans, and became prior of the monastery at Santarem in 1578. When Philip II. of Spain took possession of Portugal, Texeira attached himself to Don Antonio, who had been proclaimed king by the Portuguese, and accompanied him into France. In 1582 he was taken prisoner by the Spaniards, but made his escape from Lisbon. He became confessor to Don Antonio, and, in process of time, preacher and almoner to the French king Henry III. He afterwards attached himself to Henry IV., and in 1596 assisted at the abjuration of Calvinism by the princefs of Condé. He was sent on one mission to England, and favourably received by king James. He died at Paris in 1604, as some say; but according to another account, in 1620.

In 1582, Texeira printed his "Compendium de Portugallia ortu Regni initiis, &c." This work was answered by order of the king of Spain; and Texeira replied, in 1592, by a "Confutatio, &c." which professed to refute the hereditary right of Philip to the crown of Portugal, and to vindicate that of Don Antonio;—probably the same work that is entitled "De Electionis Jure quod competit Viris Portugallensibus inaugurandis suis Regibus," Lyons, 1589.

As a genealogist, under which character he was distinguished, he published in 1590, "Exegetis Genealogica Arboris Gentilitæ Henrici IV., Gallorum Regis," enlarged in 1598, with the addition of the prince's of Condé's abjuration. In token of the indignation he felt at the seizure of his country by Philip, he affirmed, as it is said, in one of his sermons, that "we were bound to love all men, of whatever religion, sect or nation, even if they were Castilians." Bayle. Moreri.

TEXEL, or TESSEL, in *Geography*, an island of Holland, about 11 miles in length, and six in its greatest breadth; situated at the mouth of the Zuyder See, with a capacious and good harbour, and a fort, which commands the entrance; besides a town of the same name, it contains six villages: the land is fertile in pastures, and the whole well secured with dikes of prodigious strength and height. Near this island was the celebrated sea-fight, between the fleet of Holland, under admiral Martin Harpertz Tromp, and that of England, under admiral Blake, in the year 1653, in which Tromp was killed. In the year 1673 a battle was fought between the fleet of Holland and the united fleets of England and France, in which the victory was doubtful. N. lat. 53° 5'. E. long. 4° 40'.

TEXEUIT, or TEYENT, a town of Morocco; 100 miles W.N.W. of Morocco.

TEXT, a relative term, contradistinguished to *gloss* or *commentary*; and signifying an original discourse, exclusive of any note or interpretation.

Infinite pains have been taken by the critics, to restore, reconcile, settle, explain, &c. the text of the bible, and that of the classics. See BIBLE.

Mr. Whiston accounts for all those misunderstandings between the Old and New Testament, particularly as to the prophecies in the Old, cited as fulfilled in the New, from the corruption of the text of the Old Testament; and to obviate objections made against Christianity on that head, has published an "Essay towards restoring the true Text of the Old Testament." See PROPHECY.

This restoration he attempts to effect from the Samaritan Pentateuch, the Roman Psalter, the Apostolical Constitutions, &c.

It sufficiently appears from the learned and acceptable labours of the late Dr. Kennicott, in collating the Hebrew manuscripts of the Old Testament, that the alterations introduced into the text, &c. are mostly of a trivial nature, and by no means affect the authority of the sacred writings.

TEXT is particularly used for a certain passage of scripture chosen by a preacher, to be the subject of his sermon.

A collection of texts appropriate to different subjects, and judiciously arranged, has been published by Dr. Enfield for the use of preachers in the composition of their discourses, and also of biblical readers and students.

Anciently, the lawyers began all their pleadings with like texts of scripture.

A text-book, in several universities, is a classic author written very wide, by the students, to give room for an interpretation dictated by the master or regent, to be inserted in the interlines.

In this sense, the French say, proverbially, *Glose d'Orléans plus obscure que le texte*.

The Spaniards gave the name text to a kind of little poem, or set of verses placed at the head of a gloss, and making the subject of it: each verse being explained, one after another, in the course of the gloss.

TEXT, in *Ancient Law Authors*, is appropriated to the

book of the Four Gospels, by way of eminence. These were written in gold letters, and carefully preserved in the churches.

"Codex aurato conscriptus grammate scriptus.  
Auctus evangelicum conservat corpore textum."

TEXTUARIES, TEXTUARI, a name given to the sect of the Caraites, among the Jews.

Hillel shone among the traditionaries, and Schammai among the textuaries.

The civil and canon lawyers sometimes also call a book containing the bare text, without any gloss or commentary, a textuary, *textuarium*.

TEXTURE, TEXTURA, formed of *texo*, I weave, properly denotes the arrangement and cohesion of several slender bodies or threads interwoven or entangled among each other: as in the webs of spiders, or in cloths, stuffs, &c.

TEXTURE is also used in speaking of any union or cohesion of the constituent particles of a concrete body; whether by weaving, hooking, knitting, tying, chaining, indenting, intruding, compressing, attracting, or any other way.

In this sense, we say a close, compact texture; a lax, porous texture; a regular or irregular texture, &c.

A great deal depends on the texture of the component parts of a body: hence most of its particular properties, its specific gravity, colour, &c.

TEXTUS ROFFENSIS, is an ancient manuscript, containing the rights, customs, tenures, &c. of the church of Rochester, granted by the laws of Ethelbert, Hlothhere, Eadred, and Withred, kings of Kent, collected by Ernulf, the venerable bishop of Rochester, about the year 1100.

TEYA, in *Geography*, a river of Austria, which rises about three miles N. from Germs, passes through a part of Moravia, and runs into the March, 11 miles N.E. of Zistersdorf.

TEYN, a town of Bohemia, in the circle of Boleflau; 12 miles W.N.W. of Jung Buntzel.

TE-YUEN, a town of Asia, in the kingdom of Corea; 93 miles N.E. of King-ki-tao.

TEZA, a town of Africa, in the kingdom of Fez, with a castle. It was once a populous city, but is now much decayed, yet is still the residence of a governor and a garrison; 20 leagues N.N.E. of Fez.

TEZCUCO, or TETZCUCO, a lake of Spanish America, in the province of Mexico. The conjunct lakes of Tezcuco and Chalco are found to be about 30 British miles in length, and the former is about 15 miles in breadth; but as the latter is partly drained, so as to be at the distance of a league from the city, it is probably about twelve miles in breadth. This lake is celebrated in history, as originally containing the city of Mexico, and also as remarkable for the qualities of the water, partly fresh, and partly saline. The Chalco, or fresh-water lake in the south, appears to flow by a narrow channel into the salt lake of Tezcuco. See MEXICO, substituting for Tezcuco, *Tezcuco*.

TEZELA, a town of Africa, in the kingdom of Algiers; 5 leagues S.W. of Oran.

TEZERGBE, a town of Africa, in the kingdom of Fez; 100 miles E.S.E. of Teza.

TEZOUT, or TESSOT, a town of Africa, in the kingdom of Fez; 35 miles S. of Melilla.

TFENI, a town of Egypt, on the Nile; 10 miles S.E. of Rosetta.

TFUOI, in the *Chinese Manufactory of Porcelain*, a word used to express a particular sort of varnish for that ware,

with violet-colour and gold. The usual method of doing this at first, was by mixing gold with the common varnish, breaking the leaves very small, and then adding the common blue and the powder of calcined agate of a coarse kind, found in great plenty on the shores of their rivers. But they have since found that the brown varnish called *jskin* succeeds much better, for when the blue is mixed with this, its brown colour is lost, and the gold lies on much better than it would any other way.

They had once a method of a varied varnish, which was very beautiful, but is much neglected now; this was the giving a vessel the brown varnish on the outside with a large portion of gold, and the common white varnish within. They also varied the degree of colour on the outside, by laying on more or less of the varnish; and gave this way a variety, even in the same colour. *Observ. sur les Cōtumes de l'Asie*, p. 308.

TGIDT, in *Geography*, a town of Arabia, in the province of Oman; 48 miles N. of Fartach.

THABBA, in *Ancient Geography*, a town of Arabia Felix, situated between Menambis and Seba, now *Ebba*. Ptol.—Also, an ancient town of Africa, in the vicinity of Tichafa.

THABET EBN KORRA, in *Biography*. See THEBIT BEN CORAH.

THABILIACA, in *Ancient Geography*, a town of Albania, between the rivers Gerrus and Soanes. Ptol.

THABIR, in *Geography*, a mountain of Arabia; 20 miles S. of Medina.

THABOR, in *Ancient Geography*. See TABOR.

THABORITES. See TABORITES.

THABRACA COLONIA, *Tabarka*, in *Ancient Geography*, a town and Roman colony of Africa, in Numidia, according to Ptolemy. It was situated on the western bank, and near the mouth of the river Tusca. Some vestiges remain of walls and cisterns.

THABUCA, a town of Spain, in the interior of the Tarragonensis, belonging to the Varduli. Ptol.

THACAS, *Θακας*, in *Antiquity*, a general name given to the place or feat where the augurs made their observations.

THACCONA, in *Ancient Geography*, a town of Asia, in Babylonia, upon an arm of the Euphrates. Ptol.

THACES, a people of Scythia, on this side of the Imaus, and near it. Ptol.

THACK TYLES. See TYLE.

THÆMA, in *Ancient Geography*, a town in the interior of Arabia Deserta. Ptol.

THÆNA, or THÆNÆ, a town placed by Strabo, Pliny, and Ptolemy, on the coast of Africa, towards the commencement of the Lesser Syrtes.—Also, a town of Asia, in Syria, situated, according to Ptolemy, in Cyrrhestica.

THAGIA, in *Geography*, a town of Africa; 100 miles S.S.W. of Fez.

THAGORA, TINGORAN, in *Ancient Geography*, a post of India, at the bottom of a small gulf, in the eastern part of the peninsula, beyond the Ganges.

THAGULIS, a town of Africa, situated between the Two Syrtes. Ptol.

THAHAR KIAMEN, in *Geography*, a post of Chinese Tartary; 15 miles N.E. of Teiticar.

THAHATH, in *Ancient Geography*, the place of the 23d station of the Israelites, where they encamped, after having left Mauloth; situated in the desert of Arabia, S. of Mauloth.

THAINEE, in *Geography*, a town of Africa, in the kingdom of Tunis, near the east coast, but without a harbour, at a small distance from the mouth of a river of the same name; 120 miles S. of Tunis.

THAIS, a town of France, in the department of Paris; 2 leagues S.S.E. of Paris.

THAIS, a name given by Ægineta to a cosmetic cerate, intended to give a beautiful red to the face. Galen uses the same word to express a sort of bandage.

THALA, *Ferre Anach*, in *Ancient Geography*, a town of Africa, in Numidia, according to Sallust and Tacitus.—Also, a mountain of Africa, in Interior Libya, and the people inhabiting its vicinity were called Thalæ.

THALACH, in *Geography*, a river of Bavaria, which runs into the Schwarzach; 5 miles W. of Greding.

THALAMEGUS, among the *Ancients*, a ship of pleasure, or yacht used by princes. It was always provided with a good cabin, or bed-chamber. See SHIP.

THALAMI *Nervorum Opticorum*, in *Anatomy*, two eminences in the brain. See BRAIN.

THALAMIA, in *Botany*, see LICHENES, one of whose kinds of *Apothecium*, or receptacle, is so denominated by Acharius.

THALAMII, among the *Ancients*, those rowers who sat in the lowest part of the ship. See the next article.

THALAMITÆ, in the *Naval Architecture of the Ancients*, a term used to express those rowers in the polycrote galleys, or those who contained several series of rowers, who sat on the thalamus of the vessel, and made the lowest row. These moved their oars and hands under the seats of the row that sat next above them. See POLYCROTA.

THALAMIUM, among the *Ancients*, a port-hole, through which the oars of the rowers in the bottom of the ship went.

THALAMUS, in *Botany*, a term used to express that part of the flower in the capitated or flosculous-flowered plants, where the embryo fruits of every separate floscule are lodged, and where afterwards the seeds are contained. This is the bottom of the cup, in the central part of which it adheres to the stalk.

THALASSAR, in *Ancient Geography*, a province of Asia, between Mesopotamia and Armenia.

THALASSOMELI, the name of a medicine used as a purge among the ancients. It was composed of equal parts of honey, sea-water, and rain-water, exposed to the sun in the dog-days, in a vessel pitched on the inside. It purged in the same manner that sea-water alone would do, but only in a milder way.

THALASSUS, in *Ancient Geography*, a town or port in the southern part of the isle of Crete.

THALATHA, a town of Asia, in Babylonia, on the banks of the Tigris, and S. of Apamea.

THALATTA, a lake or marsh, at the foot of mount Caucasus, in the environs of the people called "Coraxi." It discharged its waters into the Euxine sea, near a place called Beithæa-Ponti.

THALBIS, a river of Albania, between the Gerrus and the Soanes. Ptol.

THALEA, a town of Palestine, in the tribe of Simeon, according to the book of Joshua.

THALER. in *Commerce*. See RIXDOLLAR.

THALES, in *Biography*, the founder of the Ionic school, and of the scientific method of philosophizing among the Greeks, was born of Phœnician parents, at Miletus, in the first year of the 35th Olympiad, or about the year 580 B.C. He acquired wealth and distinction among his countrymen, and was employed at an early age in public affairs. He declined involving himself by marriage, in the cares of a family, that he might devote his whole time and attention to the study of philosophy; alleging, as it is said, to his mother, who urged him to marry, at an early age

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"it is too soon," and at a more advanced period "it is too late." In order more entirely to disengage himself from every avocation that would divert his mind from his favourite pursuits, he committed the care of his estate to his sister's son, whom he adopted. In search of wisdom, he travelled to Crete, and afterwards to Egypt. From the priests at Memphis in the latter country, he is said by several writers to have gained his knowledge of philosophy and mathematics. But it is more probable that he was more indebted to his own talents and assiduity in the exercise of them, than to any communication from them; and accordingly it has been affirmed, that he taught them how to measure the height of their pyramids. Upon his return to Miletus, he was universally respected for his extraordinary wisdom and learning; and his acquaintance was eagerly courted by all who wished to improve in knowledge or to be ranked among philosophers. He was not prevented, however, by these engagements from prosecuting his mathematical, philosophical, and metaphysical studies. In this course of improvement and usefulness, and of imparting, as well as of acquiring knowledge, he protracted his life to the great age of ninety years, and died, through mere infirmity, whilst he was attending the Olympic games. Thales was ranked among the seven wise men of Greece, and might justly be reckoned one of this number, whether we consider his scientific attainments, or the moral maxims and aphorisms which are ascribed to him. Of these maxims, we shall select the following: "Neither the crimes, nor the thoughts, of bad men are concealed from the gods. Health of body, competent fortune, and a cultivated mind, are the chief sources of happiness. What is the most difficult thing? To know one's self. What the easiest? To give advice to others. How shall we best attain to virtue? By abstaining from all that we blame in others. Parents may expect from their children that obedience which they paid to their own parents. Take more pains to correct the blemishes of the mind, than those of the face. Stop the mouth of slander by prudence. Be careful not to do that yourself, which you blame in another. Friends should be remembered when absent, as well as when present." Laertius. Brucker by Enfield, vol. i. For an account of his philosophical doctrines and other particulars, we refer to the article *IOXIC* *See*.

**THALETAS** of Crete, a famous lyric poet, celebrated by all antiquity as a medical musician, is said to have delivered the Lacedæmonians from the pestilence by the sweetness of his lyre; but credulity in the powers of music must be very strong indeed, in those who could believe it possible for music to drive away the pestilence. Thaletas, however, was universally believed to have possessed this power; but it is impossible to render the fact credible, without qualifying it by several circumstances omitted in the relation. In the first place, it is certain that this poet was received among the Lacedæmonians during the plague, by command of an oracle; that by virtue of this mission, all the poetry of the hymns which he sung, must have consisted of prayers and supplications, in order to avert the anger of the gods against the people, whom he exhorted to sacrifices, expiations, purifications, and many other acts of devotion; which, however superstitious, could not fail to agitate the minds of the multitude, and to produce nearly the same effects as public fasts, and, in Catholic countries, processions, at present, in times of danger, by exalting the courage, and by animating hope.

The disease having, probably, reached its highest pitch of malignity when the musician arrived, must afterwards have become less contagious by degrees; till, at length, ceasing of itself, by the air wafting away the seeds of infec-

tion, and recovering its former purity, the extirpation of the disease was attributed by the people to the music of Thaletas, who had been thought the sole mediator, to whom they owed their happy deliverance.

This is probably what Plutarch means, who tells the story; and what Homer meant, in attributing the cessation of the plague among the Greeks, at the siege of Troy, to music.

"With hymns divine the joyous banquet ends,  
The Pæans lengthen'd till the sun descends:  
The Greeks restor'd, the grateful notes prolong;  
Apollo listens, and approves the song."

Pope's Homer's Iliad, book i.

For the poet, in this passage, seems only to say, that Apollo was rendered favourable, and had delivered the Greeks from the scourge with which they were attacked, in consequence of Chryseis having been restored to her father, and of sacrifices and offerings.

This poet-musician has been confounded by some writers with Thales the celebrated Milesian philosopher; but according to Plutarch (in Lycurg.) he was cotemporary with Lycurgus the Spartan legislator, and lived about three hundred years after the Trojan war. Plutarch also informs us, that though Thaletas was only styled a lyric poet and musician, he was likewise a great philosopher and politician; inasmuch that Lycurgus brought him from Crete, when he returned from his travels, to Sparta, in order to have assistance from him, in establishing his new form of government. His odes, continues Plutarch, were so many exhortations to obedience and concord, which he enforced by the sweetness of his voice and melody. Plato, likewise, describes his captivating manner of singing; and Plutarch, in his Dialogue on Music, ascribes to Thaletas many musical compositions and inventions: such as Pæans, and new measures in verse, as well as rhythms in music, which he had acquired from the flute-playing of Olympus, whom he at first had imitated. Porphyry, in his Life of Pythagoras, says that this philosopher used to amuse himself with singing the old Pæans of Thaletas; and Athenæus likewise tells us, that the Spartans long continued to sing his airs; and, according to the scholiast on Pindar, this poet-musician was the first who composed the Hyporchemes for the armed, or military dance.

There was another poet and musician of the name of Thaletas, who was likewise a Cretan, but who flourished much later than the cotemporary and friend of Lycurgus.

**THALFANG**, in *Geography*, a town of France, in the department of the Sarre; 11 miles S.S.W. of Traarbach.

**THALHEIM**, a citadel of Bavaria, in the territory of Nuremberg; 6 miles S.E. of Hersbruck.

**THALIA**, in *Botany*, was so named by Linnæus, in memory of John Thalius, a physician at Nordhausen, in Germany, who wrote *Sylva Hercynia*, a catalogue of the plants of the Hercynian forest towards Saxony, which accompanies the *Hortus Medicus* of Joachim Camerarius, both having been printed together at Francfort on the Maine in 1588; and they are both illustrated by excellent wooden cuts. Thalius died in 1587, of a fractured thigh, in consequence of a fall from his carriage. His work abounds with original descriptions and remarks; but as Haller observes, it is not easy to ascertain all the numerous species or varieties of which he treats. The genus before us was originally called *CORTUSA* by Plumier; but that name remains with a very different plant, as the reader will find in its proper place.—Linn. Gen. 4. Schreb. 6. Willd. Sp. Pl. v. 1. 15. Ait. Hort. Kew. v. 1. 3. Roscoe Tr. of Linn. Soc.

Soc. v. 8. 340. t. 20. f. 3. Brown Prodr. Nov. Holl. v. 1. 307. Pursh 584. Juss. 63. (Cortufa; Plum. Gen. 26. t. 8. Peronia; Redout. Liliac. v. 6. 342.)—Class and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Linn. *Cannæ*, Juss. *Cannæ*, Brown.

Gen. Ch. *Cal.* Perianth superior, of three equal, ovato-lanceolate, permanent leaves. *Cor.* of one petal, irregular. Tube none. Limb double: the outer divided to the base into three equal, oblong, concave segments, much longer than the calyx: inner two-lipped; its upper lip convolute, abrupt, slightly three-lobed, hardly so long as the outer limb; lower twice as long, deeply three-lobed, with two awl-shaped appendages, the central lobe contracted in the middle. *Stam.* Filament one, declining, linear, depressed, the length of the upper lip, and attached to one of its edges; anther simple, ovate, of one cell, opening inwards. *Pist.* Germen inferior, roundish; style cylindrical, longer than the stamen, revolute; stigma irregular, ringent, perforated, beardless. *Peric.* Berry oval, of one cell, with a thin pulp. *Seed* solitary, large, oval, with a large horny albumen, and a solitary, central, curved embryo, accompanied by an empty cell.

Ess. Ch. Calyx of three leaves. Corolla of one petal, in five deep unequal segments, without a tube. Anther simple, ovate. Style recurved. Stigma ringent, perforated. Berry with one seed.

Obs. The characters and structure of the flower have in few genera been involved in so much uncertainty as in *Thalia*. We have endeavoured to draw up as correct a description as we could, from Mr. Sowerby's excellent plate of *Thalia dealbata*, published in 1794, by the late Mr. Frazer, and delineated under our inspection. Mr. Brown's learned remarks have assisted us as to the seed. The above description will be found to agree with Plumier's account of the original species, as far as any thing can be understood from thence; leaving little doubt that the two plants in question form one genus. Linnæus has left many manuscript corrections of his generic characters of *Thalia*, we know not from whence derived, which, though they accord as far as they go with our observations, do not supersede them. The present genus, no doubt, is next akin to *MARANTA*, but their differences will appear evident from a comparison of their descriptions. They both belong to the new order of *Cannæ*, or *Cannæ*, recently separated by Mr. Roscoe and Mr. Brown from the LINNÆAN SCITAMINEÆ. See that article.

1. *T. geniculata*. Distant-flowered *Thalia*. Linn. Sp. Pl. 3. Willd. n. 1. Swartz Obs. 9. (Cortufa arundinacea, amplis cannacori foliis; Plum. Gen. 26. Ic. 98. t. 108. f. 1.)—Leaves ovate. Flowers remote, alternate. Bractæas oblong.—Native of the West Indies, but hitherto seen by Plumier only. His figures are our only certain authority for this species; for Dr. Swartz has well observed, that the synonyms which authors have accumulated, do not belong to it; and that what Rottboll has described and figured, seems more akin to *T. cannaformis*, hereafter mentioned. We have indeed specimens, gathered by Mr. Frazer in 1810, in Cuba, near the Havannah, which greatly resemble Plumier's figure, and may be his plant, though from the impossibility of examining their fructification, we dare not assert them to be so. Nevertheless we shall describe them, that botanists may form their own opinion. The stem is several feet in height, erect, round, smooth, leafy, alternately branched. Leaves alternate, ovate, pointed, smooth, above a foot long, with one rib, and many fine transverse curved veins. Foot-stalk sheathing, compressed, half as long as the leaf, with an oblong, cylindrical knot at the summit. Panicle subdivided, with long, linear, obtuse, flat, erect scales, or general bractæas,

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at each subdivision. Flower-stalks zigzag, knotty, round, two or three inches long. Partial bractæas two at each knot, the outermost much the largest, embracing and concealing the other, an inch in length, elliptic-oblong, green, finely ribbed, clothed with scattered shining hairs. Between these bractæas is situated a pair of flowers, whose dried corolla is partly purple, and whose pale, much convoluted and wrinkled lip bears some resemblance to Plumier's figure.

2. *T. dealbata*. Mealy *Thalia*. Roscoe Tr. of Linn. Soc. v. 8. 340. Dryand. in Ait. n. 1. Pursh n. 1. Frazer's single plate. Curt. Mag. t. 1690. (Peronia stricta; Redout. Liliac. t. 342.)—Leaves ovate. Flowers crowded. Bractæas ovate, mealy.—Native of impenetrable swamps in South Carolina, flowering in August and September. Mr. Pursh says it was first discovered there by T. Millington, esq. Living plants were brought to England by the late Mr. Frazer in 1791, by which this handsome and curious species first became known to botanists. Its root is of course perennial. Stem four or five feet high, erect, round, smooth; leafy at the bottom; panicled at the top, covered with a silvery mealiness, which clothes also the general as well as partial bractæas, and is easily rubbed off by a touch. Leaves light green, smooth, above a foot long, on round sheathing stalks, with a knot at the top. General bractæas lanceolate, concave, convolute, a span long. Flower-stalks aggregate or compound. Partial bractæas crowded, in pairs, much more tumid, ovate, and shorter than in the foregoing, each pair containing two purple flowers, whose structure is detailed in our generic character. Fruit purple, the size of a hazel-nut, slightly pulpy.

3. *T. cannaformis*. Elliptical *Thalia*. Forst. Prodr. 1. Willd. n. 3. Buchanan in Symes's Embassy to Ava, ed. 2. v. 3. 305. t. 21.—Leaves elliptical. Partial bractæas linear-lanceolate, shorter than the divided partial flower-stalk.—Native of moist woods in the remote islands of the East Indies, and the New Hebrides, flowering in March and April. The stem is solid, branched, round, smooth, leafy, divaricated at the joints. Leaves alternate, broadly elliptical, pointed, smooth, on round sheathing stalks. Panicle terminal, with long, slender, pendulous branches, upon which the flowers are arranged pretty closely. Every pair of long narrow partial bractæas contains a divided stalk, bearing two large white flowers, each with the rudiment of another at its base. The corolla is somewhat tubular, and the lower lip of its inner limb has two large equal lobes, but in other respects the parts of fructification seem to answer well enough to the generic character. The fruit, however, which must settle that point, is unknown.

Our learned and highly valued friend Mr. Roscoe has suggested, that the *Maranta Cachibou*, Jacq. Fragm. Bot. 52. t. 69 and 70, of which we have a specimen gathered by Mr. Masson at St. Kitt's, may probably be a *Thalia*. Its seed certainly confirms this opinion, but the parts of the flower are not yet sufficiently described to authorize any conclusion, nor can we unravel their structure from the dried plant. Whatever becomes of this species, the *Maranta Casupo*, t. 63. f. 4, of the same work, and *M. Casupito*, t. 64. f. 2, must assuredly be referred to the same genus.

THALIA, in *Mythology*, one of the nine Muses, who presided over comedy and pastorals. She is distinguished from the other Muses by her mask, and from the tragic Muse by her shepherd's crook; her aspect is likewise meaner than that of Melpomene, and her dress shorter and less noble than that of the other Muses.

THALIA was also the name of one of the Graces.

THALICTRUM, in *Botany*, may possibly be, as generally

## THALICTRUM.

rally supposed, the *θαλιτρον* of Dioscorides, from whom the name is adopted. That point, however, was not determined by Dr. Sibthorp, though he noticed five species of this genus in Greece or its neighbourhood. The above name is, by Ambrosini and others, derived from *θαλλω*, to be green and flourishing. Some old authors occasionally write it *Thalietrum*.—Linn. Gen. 280. Schreb. 277. Willd. Sp. Pl. v. 2. 1295. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 583. Prodr. Fl. Græc. Sibth. v. 1. 378. Ait. Hort. Kew. v. 3. 346. Pursh 388. Juss. 232. Tourn. t. 143. Lamarck Illustr. t. 497. Gärtn. t. 74.—Class and order, *Polyandria Polygynia*. Nat. Ord. *Multifloræ*, Linn. *Ranunculaceæ*, Juss.

Gen. Ch. Cal. none, except the corolla be taken for such. Cor. Petals four or five, roundish, obtuse, concave, deciduous. Stam. Filaments numerous, dilated upwards, compressed, longer than the corolla; anthers terminal, oblong, erect. Pist. Germens superior, numerous, mostly stalked, roundish; styles none; stigmas thickish. There are also several very short imperfect pistils. Peric. none. Seeds several, ovate, furrowed, without any appendage.

Ess. Ch. Calyx none. Petals four or five. Seeds naked, without appendages.

Obs. Linnæus remarks, that his *T. tuberosum* and *cornutum* have five petals; *dioicum* has the stamens and pistils on separate plants; *aquilegifolium* and *contortum* have stalked pendulous seeds, furnished with three dilated or winged angles; moreover, that the number of stamens and pistils differs in the different species, being sometimes less than the characters of the class and order require.

This is a very distinct well-marked genus of perennial herbaceous plants, all natives of the cold or temperate climates of Europe and North America. The leaves are compound, with roundish, rarely oblong, lobed or notched leaflets; paler, or glaucous, underneath; usually smooth. Inflorescence panicled. Flowers white or yellowish, with some slight tinge of purple, generally of an elegant feathery appearance. Fourteen species are described in Linn. Sp. Pl.; twenty-one in Syst. Veg. ed. 14. Willdenow has twenty-three. Four are British. Nineteen are enumerated in Mr. Aiton's *Hortus Kewensis*. Their qualities in general are believed to be of an acrid nature, like those of *Ranunculus* and *Clematis*; but milder.

We have some additions and corrections to make, which require a compendious review of the whole genus.

1. *T. alpinum*. Alpine Meadow-Rue. Linn. Sp. Pl. 767. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 262. Lightf. 286. t. 13. f. 1. Fl. Dan. t. 11. (*T. minimum montanum atro-rubens, foliis splendentibus*; Raii Syn. 204. Boerh. Ind. Alt. v. 1. 44. t. 1.)—Stem perfectly simple, and almost naked. Cluster simple, terminal.—Native of moist black bogs, or the turfy margins of alpine hills, on the loftiest mountains of Lapland, Scotland, and Wales, flowering in June. The root is perennial, creeping, with a few simple fibres. Stem erect, about six inches high, round, glaucous or purplish, with one leaf, more or less compound, about the middle. Radical leaves several, stalked, erect, half as tall as the stem; first ternate; then either again ternate, or pinnate; the leaflets roundish, or wedge-shaped, veiny; glaucous beneath. Cluster at first drooping, then erect, of eight or ten alternate flowers, whose petals, and eight or ten filaments, are either white or purple; their anthers orange. Germens two or four only, roundish, green, each with a whitish, broadly-lanceolate, divaricated, downy stigma, about its own length. Linnæus describes twelve stamens, and eight pistils.

2. *T. fatidum*. Fetid Meadow-rue. Linn. Sp. Pl.

768. Willd. n. 2. Ait. n. 2. "Waldst. et Kitzeb. Hung. v. 2. 190. t. 174." (*T. minimum fetidissimum*; Bauh. Prodr. 147. Pluk. Phyt. t. 65. f. 4. Morif. sect. 9. t. 20. f. 13. T. n. 1140; Hall. Hist. v. 2. 58.)—Stem panicled, round, leafy. Leaves triply compound, minutely downy on both sides. Flowers drooping. Petals slightly hairy. Stigmas auricled at the base.—Native of France, Switzerland, and Siberia, flowering in May. A species of a delicate aspect, and glaucous hue, about a foot high, with innumerable, small, rounded, lobed, tender leaflets. The petals are externally reddish, especially in the young plant, and finely downy or hairy. Stamens long and capillary. Seeds ovate, strongly furrowed, crowned with the permanent shrivelled stigmas, whose dilated or auricled base is distinguishable in our Swiss specimens. This last character is, in the *Supplementum*, p. 271, made the peculiar mark of *T. styloideum*, there described from a Siberian specimen, which Linnæus did not recognize as his own *T. fatidum*. The *styloideum*, Willd. n. 22, is therefore to be struck out. Several Swiss botanists have confounded the species before us with *T. minus*, hereafter described, which is Haller's n. 1139. That eminent writer had some doubts respecting the difference between the two, which we shall attempt to remove when we come to the other, Linnæus having placed them far asunder. The *fatidum* is said to exhale a very bad and powerful odour, like *Geranium robertianum*, or, as Haller says, the urine of cats.

3. *T. tuberosum*. Tuberous-rooted Meadow-rue. Linn. Sp. Pl. 768. Willd. n. 3. Ait. n. 3. Mill. Ic. v. 2. 177. t. 265. f. 2. (*Oenanthe Myconi*; Dalech. Hist. 785. *Ranunculus thalictri folio minor, aphodeli radice*; Morif. sect. 4. t. 28. f. 13.)—Leaflets rounded, glaucous, smooth. Petals five. Root tuberous.—Native of Spain and the Pyrenees. A hardy perennial in our gardens, flowering in June, but confined to the more curious collections. The root consists of ovate knobs. Herb smooth, a foot or more in height, of a light glaucous green. Flowers panicled, not numerous, distinguished by their five large, ovate, white petals, and small stigmas. Morison's figure is badly copied from that of Dalechamp.

4. *T. Cornuti*. Canadian Meadow-rue. Linn. Sp. Pl. 768. Willd. n. 4. Ait. n. 4. Pursh n. 1. (*T. canadense*; Cornut. Canad. 186. t. 187. *T. femine triquetra, foliis aquilegiæ*; Morif. sect. 9. t. 20. f. 15.)—Leaflets rounded, three-lobed, glaucous, smooth. Panicles terminal. Flowers dioecious. Petals five. Root fibrous.—On the banks of rivers, and in wet meadows, from Canada to New England, flowering in June and July. Root perennial. Stem from two to three feet high. Flowers small, greenish-yellow. Pursh. Cornuti says the unexpanded petals are pale purple; the stamens white, numerous, with yellow anthers. Seeds triangular. The dioecious nature of the flowers, which we have had no opportunity of observing, was first noticed in *Hort. Kew*.

5. *T. dioicum*. Dioecious Early Meadow-rue. Linn. Sp. Pl. 768. Willd. n. 5. Ait. n. 5. Pursh n. 2. Muhlenb. Cat. 54.—Leaflets heart-shaped, many-lobed, very smooth. Panicles axillary. Flowers dioecious. Petals not longer than the filaments or germens. Stigmas almost capillary.—Native of shady woods and the banks of rivers, from Canada to Virginia, flowering from May to July, according to Pursh, who says the flowers are white. He conceives his plant to be the same with *T. levigatum* of Michaux, Fl. Boreali-Amer. v. 1. 322, who confesses his inability to determine the North American *Thalictra*, they being almost all dioecious. Specimens from the late Dr. Muhlenberg, now before us, and agreeing exactly with those sent by Kalm to Linnæus,

# THALICTRUM.

Linnæus, as recorded in Sp. Pl., are certainly dioecious, about a foot high, very smooth, with thrice-ternate leaves, whose lobes are usually from five to seven, blunt, and rather shallow; both their surfaces reticulated with slightly prominent veins. *Panicles* solitary or in pairs from the bosoms of the leaves, somewhat umbellate, on long stalks, and often accompanied by a long-stalked solitary flower. *Petals* of the male flowers white or reddish, ovate, ribbed, the length of the very slender numerous *filaments*, whose *anthers* are yellow, very narrow, pointed; those of the female flowers much smaller and rounder, white or greenish, hardly so long as the little, oval, ribbed *germens*. The *stigmas* are very slender, and remain in a prominent, almost capillary, form, on the ovate-oblong, striated *seeds*.

6. *T. elatum*. Tall Meadow-rue. Jacq. Hort. Vind. v. 3. 49. t. 95. Willd. n. 6. Ait. n. 6.—Leaflets ovate, three-lobed, smooth, somewhat notched. Panicle much branched, terminal. Flowers erect. Filaments capillary. Stigmas ovate, short.—Native of Hungary. Introduced into England by Mr. Hunnemann in 1794. A hardy perennial, flowering from June to August. Aiton. An unnamed specimen in the Linnæan herbarium manifestly agrees with Jacquin's plant, which is four feet or more in height. The stem is more furrowed in our specimen than he represents. The leaves are ternate from their very base, then twice or thrice pinnate, glaucous, incorrectly three-lobed, and somewhat cut besides. Flowers white, erect, in an upright compound panicle. Petals ovate, rather small, sometimes purplish. Filaments of equal thickness throughout, about thrice the length of their oblong, linear, pointed anthers, which Jacquin represents rather shorter and rounder than we find them. Germens angular. Seeds elliptic-oblong, glaucous, furrowed, crowned with the short shriveled stigmas.

7. *T. majus*. Greater Meadow-rue. Jacq. Auftr. v. 5. 9. t. 420. Willd. n. 7. Fl. Brit. n. 3. Engl. Bot. t. 611.—Leaflets roundish, somewhat heart-shaped, three-cleft; glaucous beneath. Panicle leafy, with aggregate branches. Flowers drooping.—Native of woods and bushy places in Austria, Hungary, Mount Athos, and the north of England, perennial, flowering in June and July. The late Mr. Robson of Darlington found it at Baydales, near that town, as well as on the margin of Ulls-water, Cumberland. This is about the size of the last, but the leaves are of a darker green on the upper side, very glaucous beneath. The branches of the panicle grow very together, from the bosoms of the upper leaves, and the flowers, at least their stamens, are pendulous, with longer anthers than the preceding. The petals moreover are green. In the germens and stigmas we perceive no particular distinction.

8. *T. medium*. Intermediate Meadow-rue. Jacq. Hort. Vind. v. 3. 50. t. 96. Willd. n. 8. Ait. n. 8.—Leaflets oblong-wedge-shaped, three-cleft, notched; the uppermost lanceolate. Panicle much branched, slightly leafy. Stamens spreading.—Native of hilly situations in Hungary. A hardy perennial, flowering in June and July, introduced at Kew, by Mr. Hunneman, in 1789. Specimens in the herbarium of Linnæus, from the Upsal garden, which he suspected might be *T. tuberosum*, n. 3, appear rather to belong to the present species, which differs from the two last in the narrowness of its leaflets, agreeing with them in the germens and stigmas. The panicle is more like *elatum* than *majus*. The stamens are not pendulous, but divaricated. Petals elliptical, greenish. Leaves light green, somewhat glaucous.

9. *T. minus*. Lesser Meadow-rue. Linn. Sp. Pl. 769. Willd. n. 9. Fl. Brit. n. 2. Engl. Bot. t. 11. Fl. Dan.

t. 732. Jacq. Auftr. v. 5. 9. t. 419. Segu. Veron. 476. Vill. Dauph. v. 3. 713. Ger. Em. 1251. (*T. alpinum minus saxatile, rutæ folio, staminibus luteis*; Segu. Veron. 476. t. 11.)—Leaflets roundish, three-cleft, notched, somewhat glaucous on both sides. Panicle slightly leafy. Flowers pendulous.—Native of various parts of Europe, from Sweden to Greece, generally on a limestone or chalky soil, flowering in June and July. Our British plant precisely agrees with what was found in Gothland by Linnæus, though he subsequently confounded "things innumerable, both small and great," under *T. minus*. The true one is a bushy spreading herbaceous perennial, of humble growth, generally but a foot high, smooth, of a glaucous hue, with tints of violet. Leaflets rather small, various in breadth. Panicle moderately branched. Flowers pendulous, though the stalks become more erect when in seed. Petals elliptical, concave, light purple, sometimes jagged or fringed. Stamens capillary. Anthers long, linear, pointed, as in the last. Germens and seeds small. Linnæus's specific definition, *foliis sexpartitis*, has puzzled every body, and is inapplicable to any thing ever taken for the present species. He perhaps meant that each leaf consisted of six primary divisions, which is mostly the case.

10. *T. rugosum*. Rugged Meadow-rue. Ait. ed. 1. v. 2. 262. ed. 2. n. 10. Willd. n. 10. Pursh n. 3. Muhlenb. Cat. 54.—Leaflets ovate or lanceolate, rugged, veiny, bluntly lobed. Stem round, striated. Panicle corymbose. Flowers erect.—On the banks of rivers, and in swamps, from Pennsylvania to Carolina, flowering from June to August. Perennial, very tall, sometimes above five feet high. Flowers white. Pursh. The habit of this plant is more like some of the large species hereafter described, with a large terminal dense, almost leafless, tufted panicle. Stamens capillary. Anthers linear.

11. *T. sibiricum*. Siberian Meadow-rue. Linn. Sp. Pl. 769. Willd. n. 11. Ait. n. 11. (*T. orientale minimum, fumaricæ folio*; Tourn. Cor. 20. Willd.)—"Leaves in three divisions; leaflets somewhat reflexed, sharply cut. Flowers drooping."—Found by Gmelin in Siberia; and by Tournefort, if we are right in his synonym, in Armenia. Linnæus doubtfully cites a synonym of Seguir, which, after Haller, we have referred to *T. minus*. His account of the present species, of which we know nothing, is, that its habit accords with *T. minus*, or *purpurascens*, but the leaflets are small, but one-sixth as large as those species, glaucous like Rue or Fumitory. Stem green, copiously panicked. Panicle brown at its divarications. It flowers later, at the same time as *flavum* and *dioicum*.

12. *T. squarrosum*. Squarrose Meadow-rue. Willd. n. 12.—"Leaflets three-cleft or undivided. Footstalks membranous, winged, clasping the stem. Flowers drooping."—Native of Siberia. Differs from all the foregoing species which have drooping flowers, in the structure of its footstalk. The leaves are repeatedly compound, as in the rest; their lateral leaflets mostly ovate, acute, and entire, but the terminal, and even the uppermost lateral ones, are divided or three-cleft. Footstalk greatly dilated at the base, with orbicular membranous wings, toothed at the margin. There are also lesser orbicular toothed auricles, upon the partial footstalks, by which mark the species is easily known. Willdenow. We have met with nothing answering to this description.

13. *T. purpurascens*. Purplish Meadow-rue. Linn. Sp. Pl. 769. Willd. n. 13. Ait. n. 12. Pursh n. 5.—(*T. virginianum elatius glaucum, florum staminibus purpurascens*; Morif. v. 3. 324.)—"Stem twice as tall as the leaves. Leaflets roundish, three-cleft, cut. Panicles

nearly naked. Flowers drooping. Stamens coloured."— On dry sunny hills, in Pennsylvania and Virginia. Perennial, flowering in May and June. A small plant. *Stem and filaments purple.* Pursh. Linnæus contrasts this with *T. minus*, a species concerning which his ideas were too vague, for us to learn any thing from such a comparison, nor does his herbarium lend us any certain aid. There is, however, an unmarked specimen, which he associated with *T. dioicum*, but which may possibly be the *purpurascens*. It has broad ivy-like leaflets, but is more particularly distinguished by short elliptical anthers, whose filaments are gradually dilated upwards, approaching to those of *T. flamineum* hereafter described.

14. *T. pubescens*. Downy Polygamous Meadow-rue. Pursh n. 4. Muhlenb. Cat. 54.—Leaflets ovate, somewhat heart-shaped, or wedge-shaped; three-lobed at the end; slightly downy beneath. Panicles terminal. Flowers polygamous. Anthers linear. Styles awl-shaped, twice as long as the germens.—On the banks of ditches and rivulets, in Pennsylvania and Virginia, flowering from June to August. A tall species, with white flowers. Pursh. We have this from our late venerable correspondent, the Rev. Dr. Muhlenberg. The leaflets are rather large; dark green, and somewhat rugged, above; paler, reticulated with prominent veins, and minutely downy, at the back. Flowers nearest to those of *T. dioicum*, and like them distinguished by long tapering stigmas. The anthers are linear-oblong; their filaments almost equally slender throughout.

15. *T. angustifolium*. Narrow-leaved Meadow-rue. Linn. Sp. Pl. 769. Willd. n. 14. Ait. n. 13. Jacq. Hort. Vind. v. 3. 25. t. 43.—Leaflets linear-lanceolate, or linear, mostly undivided, entire. Panicle much branched, dense. Flowers erect. Stigmas heart-shaped, half the length of the germens. Native of Switzerland and Germany, but not frequent any where. Dr. Sibthorp, however, gathered it on the Bithynian Olympus. Miller seems to have cultivated it, in his time, at Chelsea, but we have scarcely ever seen a living specimen, and we are much inclined to concur in opinion with those who judge it a variety of the following, their habit, inflorescence, and flowers, being exactly the same, however different the breadth of their leaflets. Bauhin's synonym, uniformly referred to this, certainly belongs to *T. simplex*, n. 17.

16. *T. flavum*. Common Meadow-rue. Linn. Sp. Pl. 770. Willd. n. 15. Fl. Brit. n. 4. Engl. Bot. t. 367. Fl. Dan. t. 939. (*T. nigricans*; Jacq. Austr. v. 5. 10. t. 421. Willd. n. 16. *T. nigrius*, caule et femine striato; Bauh. Hist. v. 3. 486. *T. majus*, foliis rugosis trifidis; Morif. sect. 9. t. 20. f. 3.)—Leaflets rounded or oblong, three-cleft. Panicle much branched, dense. Flowers erect. Stigmas heart-shaped, half the length of the germens.—Found in moist meadows, and the reedy margins of rivers, throughout Europe, from Sweden to Greece, flowering in July. The root is yellow, perennial. Stem three feet high, erect, smooth, leafy, furrowed or angular, simple below. Leaves nearly sessile, twice ternate, with a short sheathing base, or footstalk; leaflets slightly glaucous, most low beneath; either undivided or three-cleft, entire, veiny, varying extremely in breadth, length, and sharpness. Panicle terminal, erect, dense, corymbose, much branched, somewhat leafy. Flowers and stamens erect, yellowish-white, with oblong, slightly pointed, yellow anthers. Stigmas oblique, heart-shaped, downy. Seeds deeply furrowed. The vague resemblance of this plant to the garden rue, and its place of growth, seem to have given the English name of the whole genus. Jacquin's *nigricans*, found frequently in England, differs merely in the elongation and comparative narrowness

of its leaflets, which approach in those respects to the *angustifolium*, last described.

17. *T. simplex*. Simple-stalked Meadow-rue. Linn. Mant. 78, excluding the synonym. Willd. n. 17. Ait. n. 15. Fl. Dan. t. 244. Ehrh. Phytoph. 15. (*T. angustifolium*; Villars Daup. v. 3. 712. *T. angustissimo folio*; Bauh. Prodr. 146. Morif. sect. 9. t. 20. f. 8.)—Leaflets linear. Stem angular, simple. Panicle branched, compound, lax, somewhat racemose. Flowers pendulous. Stigmas roundish-heart-shaped.—Native of Sweden, Denmark, Switzerland, and France. Introduced at Kew by the very eminent cultivator and botanist M. Thouin, in 1778. It is a hardy perennial, flowering in May and June. This is unquestionably akin to the last, but essentially distinct. The whole plant is but half as large, with a much more angular stem. The leaflets are extremely narrow, and revolute, unaccompanied by any of the partial stipular scales, seen on the leaves of *T. flavum*. The panicle is more oblong and lax, not corymbose. Flowers smaller, drooping, or rather quite pendulous, not erect. Petals green, not white or yellowish. Stigmas remarkably round and convex. We have specimens from Villars, which prove the correctness of Willdenow respecting his synonym. We have also from professor Lachenal a specimen gathered at Michelfeld, which shews this to be the plant of Bauhin, cited by Linnæus and others for *T. angustifolium*. Indeed Bauhin's wooden cut, copied by Morison, sufficiently evinces this, though, being delineated perhaps from a dried specimen, it is not exact in the position of the flowers. *T. gallioides*, Willd. Enum. Hort. Berol. 585. we believe is a very narrow-leaved variety of *simplex*.

18. *T. lucidum*. Shining-leaved Meadow-rue. Linn. Sp. Pl. 770. Willd. n. 18. Ait. n. 16. (*T. minus lucidum*, libanotis coronariae foliis; Pluk. Phyt. t. 65. f. 5.)—"Stem leafy, furrowed. Leaflets linear, fleshy."—Said to be a native of France and Spain. Miller had something in his garden which passed for this plant, and hence it is enumerated in Hort. Kew. We have never seen a specimen, nor did Linnæus know any more of the matter than what Dalibard, whose specific character we more exactly copy, has given in his *Fl. Paris*. 162. The late Mr. Davall sent us a Swiss *Thalictrum* for *lucidum*, which answers to the character, but is indubitably the *simplex* in a luxuriant state. Linnæus thought the *lucidum* was probably a variety of *flavum*. We presume various things have been taken for this plant, but in reality that it has no existence as a species.

19. *T. aquilegifolium*. Columbine-leaved Meadow-rue, or Feathery Columbine. Linn. Sp. Pl. 770. Willd. n. 19. Ait. n. 17. Jacq. Austr. v. 4. 10. t. 318. Curt. Mag. t. 1818. (*T. atropurpureum*; Jacq. Hort. Vind. v. 3. 34. t. 61. *T. majus*, florum staminibus purpurascens; Bauh. Pin. 337. Morif. sect. 9. t. 20. f. 16.)—Leaflets rounded, lobed, and cut. Stem round. Panicle corymbose. Flowers erect. Stamens dilated upwards. Germens stalked. Fruit pendulous, with three dilated wings.—Native of Sweden, Germany, Switzerland, Thrace, and Greece, common and hardy in our gardens, flowering from May to July. The stem is three or four feet high, round, somewhat striated, leafy, smooth, either glaucous or purple. Leaves large and spreading, much resembling those of *Aquilegia vulgaris*, though often more acute. Flowers large and elegant, white or pale violet; their petals reflexed; their very numerous stamens moderately dilated upwards, flattened, of the hue of the petals, with short yellow anthers. Germens triangular, on long stalks, at length deflexed or pendulous, and becoming somewhat obovate, obtuse, straightish seeds, with three unequal, much dilated, smooth wings.

wings. Retzius, in his *Obs. Bot. fasc. 6. 30. sect. 52*, justly indicates the identity of Jacquin's *T. atropurpureum* and the Linnæan *aquilegifolium*, confessing he could not decide concerning the *aquilegifolium* of Jacquin. We have a wild Swiss specimen of the latter, Haller's n. 1141, precisely answering to the plate in *Fl. Austria*, and certainly not differing in any essential character from the true plant of Linnæus, so frequently cultivated for ornament, and preserved in his herbarium.

20. *T. contortum*. Twisted-seeded Meadow-rue. Linn. Sp. Pl. 770. Am. Acad. v. 4. 47. Willd. n. 20. Ait. n. 18.—“Fruit pendulous, triangular, contorted. Stem rather two-edged.”—Native of Siberia. Linnæus thought it a hybrid offspring of *aquilegifolium* impregnated by the *minus*. His specimen is not to be distinguished from the former, and we cannot but agree with Willdenow's remark, that the contortion of the *seeds* is merely a sign of imperfection. Neither can any more solid dependance be had on the comparative number of the parts of fructification, on the white colour of the *flowers*, or the humbler stature of the herbage. We conclude this supposed species therefore to be scarcely even a variety of the last.

21. *T. petaloideum*. Daurian Meadow-rue. Linn. Sp. Pl. 771. Willd. n. 21. Ait. n. 19. (*T. flamineum*; Linn. Suppl. 271.)—Leaflets rounded, obtuse; partly three-lobed. Stem nearly leafless. Panicle somewhat umbellate. Stamens much dilated, linear-obovate. Germens sessile.—Native of Siberia. Mr. Loddiges is said to have introduced this curious and very distinct species to the knowledge of our cultivators, in 1799. It has a perennial root, with long, simple, rather fleshy fibres. Stem simple, about a foot high, striated, purple at the bottom, leafless, except an occasional leaf, accompanying a small lateral branch. Radical leaves two, spreading, thrice compound, on purplish stalks; leaflets very much like Common Rue, but smaller. Flowers white, large but not numerous, in a sort of corymb, or imperfect umbel, accompanied by a few small leaflets. Petals roundish, deciduous. Stamens very numerous, white, flat, and singularly dilated, with a mid-rib; their anthers yellow, narrow and short. Germens ovate, ribbed, with awl-shaped recurved stigmas. Willdenow makes *T. flamineum* a variety, little supposing that the very identical specimens, so minutely and accurately described in the *Species Plantarum*, could be again described, without a reference, in the *Supplementum*.

We have to exclude *T. japonicum*, Thunb. Tr. of Linn. Soc. v. 2. 337. Willd. n. 22, a specimen from Thunberg himself proving it to be no other than *Coptis asplenifolia* of Mr. Salisbury, Tr. of Linn. Soc. v. 8. 306, a circumstance as wonderful as that its discoverer should ever have thought this plant similar to a *Salvia*. See *Fl. Jap.* 364.

*T. ranunculinum*, Willd. Enum. Hort. Berol. 585. Pursh n. 6, having simple leaves, and being not noticed as a *Thalictrium* by Muhlenberg himself, who is quoted for it, is, we presume, best omitted here; as well as *T. concinnum*, Willd. Enum. 584, which is probably comprehended under some of the foregoing species.

THALICTRUM, in Gardening, contains plants of the hardy, herbaceous, fibrous-rooted, perennial kinds, among the number of which the species mostly cultivated are; the tuberous-rooted meadow-rue (*T. tuberosum*); the Canadian meadow-rue (*T. cornuti*); the fetid meadow-rue (*T. fetidum*); the narrow-leaved meadow-rue (*T. angustifolium*); the shining-leaved meadow-rue (*T. lucidum*); and the columbine-leaved meadow-rue, or feathered columbine (*T. aquilegifolium*).

In the second sort there is a variety, which is smaller, with pale purple filaments, than the common kind.

Also in the sixth sort there are varieties with a green stalk and white stamens, and with a purple stalk and stamens. Besides, there are other sorts that may be cultivated for variety.

*Method of Culture*.—All the sorts are readily increased by parting the roots, and planting them out in the autumn when the stems decay, or in the spring before the new ones are set forth, the strongest where they are to remain, and the weaker ones in nursery-rows for further growth; they may also be raised from seeds, which should be sown in a bed or border in the spring: when the plants rise, they should be kept clean, and be planted out where they are to remain, in the following autumn. They are all hardy durable plants that succeed and grow well in any common soil and exposure in the open ground, but which flourish most in moist shady situations. They afford variety in the borders, and other parts of ornamented grounds, when set out in a properly varied manner, requiring but little trouble or attention in such situations.

THALINA, in *Ancient Geography*, a town of Asia, in the Greater Armenia, upon the banks of the Euphrates. Ptol.

THALLABA, TALABAN, a town of Asia, in Mesopotamia, upon the banks of the river Chaboras, situated E.S.E. of Resæina.

THALLAND, in *Geography*. See DALIA.

THALLITE, in *Mineralogy*; *Epidote*, Haüy; *Delphinite*, Saussure; *Shorl vert du Dauphiny*, Romé de Lisle; *Acaticene*, Dendrada; *Pistacit*, Werner. Few minerals have received so many names as this: it is at present better known by the name of epidote or thallite. It has frequently been confounded with actinolite or strahlstein, and with green hornblende and green asbestos. Some account of this mineral is given under PISTACITE. We shall here add its distinctive characters and constituent parts. From actinolite it may be distinguished by the colour, the latter being generally a lighter green. The structure of the massive varieties of actinolite is generally radiated, that of epidote compact or foliated. Both the joints of actinolite are distinctly seen; but in epidote, frequently one joint only is seen. Epidote melts into a blackish scoria before the blowpipe, and is harder than actinolite or hornblende; the latter has generally a different shade of green: the fracture of hornblende is also less vitreous than that of epidote. Green asbestos is soft when pounded; the powder of epidote is harsh and rough. Thallite or epidote occurs both massive and crystallized. The joints are in two directions, one of which is more obvious than the other. The alternate angles are about  $114\frac{1}{2}^{\circ}$  and  $65\frac{1}{2}^{\circ}$ ; the cross fracture is splintery. The primitive form of the crystal is a prism with rhomboidal bases. The most common forms are six or eight-sided prisms, of which four are larger than the others. These prisms are terminated by several oblique planes, and are often flatly acuminate; the terminating planes of the crystals are smooth, and have a high natural polish; they are sometimes convex. The lateral planes, or sides of the crystals, are striated. This mineral is found in beds and veins, and sometimes as a constituent part of rocks. It is associated with augite, garnet, hornblende, quartz, calcareous spar, and magnetic iron-stone. The varieties that occur in veins are of a lighter colour, and the crystals are more acicular than those which are found in beds. The veins contain feldspar, axinite, rock-crystal, chlorite, and other minerals; the epidote forming only a small part of the substance of the vein. It is found in several parts of the Scotch Hebrides, and in various alpine districts, in sienite, porphyry, and granitic rocks. The finest crystals have been procured at Arundel in Norway. The constituent

fituent parts of this mineral, from different situations, agree more nearly than is frequently the case with other minerals.

	From the Valais.	From Oisans.	From Arundel.
Silex - - -	37.0	37.0	37
Alumine - -	26.6	27.0	21
Lime - - -	20.0	14.0	15
Oxyd of iron -	13.0	17.0	24
Oxyd of manganese	0.6	1.5	1.5
Water - - -	1.8	3.5	1.5
Lofs - - -	1.	0	0

It differs in chemical composition from hornblende and actinolite, by the absence of magnesia, and by the large proportion of alumine which it contains.

**THALLOPHORI**, *Θαλλοφορι*, in *Antiquity*, the old men and women, who, in the procession of the festival *panathenæa*, carried olive-boughs in their hands.

**THALLUS**, in *Botany and Vegetable Physiology*, *Θαλλος*, an olive bud, or a green bough; from *θαλλω*, to be verdant, to shoot forth, or spread abroad; a term aptly enough chosen by the distinguished professor Acharius, for the frond, or foliage, of a *Lichen*, whether that part be of a leafy, fibrous, scaly, or crustaceous nature. But this term, however apt, is superfluous, *frons*, used by Linnæus, being synonymous with it, and sufficient for every requisite purpose. See **LICHEN** and **LICHENES**; also **FROND**.

**THALMANSFELD**, in *Geography*, a town of Germany, in the marggravate of Anspach; 4 miles W. of Thalmessing.

**THALMESSING**, or **THALMESSINGEN**, a town of Germany, in the principality of Anspach; 31 miles S.E. of Anspach. N. lat. 49° 1'. E. long. 11° 10'.

**THALMIS**, or **TALMIS**, in *Ancient Geography*, a town of Egypt, between Taphis and Tutzis. Anton. Itin.

**THALPUSA**, a town of the Peloponnesus, in Arcadia; which belonged to the Orchomenians.

**THALSEA**, or **THELSEA**, a town of Phœnicia, marked on the route from Remmaris to Neapolis, between Geroda and Damascus.

**THALUDA**, a river of Africa, in Mauritania Tingitana, the mouth of which is placed by Ptolemy on the coast of the Iberian sea, between Jagath and the promontory Oleastrum.

**THALYSIA**, *Θαλυσια*, in *Antiquity*, a sacrifice offered by the husbandmen after harvest. For the origin and ceremonies of which, see Potter, *Archæol. Græc.* tom. i. p. 400.

**THAMALAPATHRA**. See **FOLIUM Indicum**.

**THAMAR**, a word used by the Arabian physicians to express a date. Hence a pectoral decoction, made with dates and other ingredients, was called *diathamyron*; and the word was afterwards corruptly written *dicameron*.

**THAMAR**, in *Ancient Geography*, a town of Judea, near Malis or Malath, which, according to Eusebius, had a Roman garrison.

**THAMARITA**, a town of Africa, in Mauritania Cæfariensis.

**THAMARO**, a town of Palestine, on the western side of Jordan. Ptolemy.

**THAMASCHALTIS**, a town of Africa Propria, on the route from the Greater Leptis to Tacapæ, between Thramusidiss and Thentel. Anton. Itin.

**THAMBES**, in *Geography*, a mountain of Algiers; 30 miles S. of Bona.

**THAME**. See **TEAM**.

**THAME**, or *Tame*, in *Geography*, a market-town in a hundred of the same name, and county of Oxford, England, is situated on the banks of the river Thames (whence it derives its name), at the north-eastern extremity of the county adjoining to Buckinghamshire, 13 miles E. from Oxford, and 46 miles

N.W. by W. from London. Dr. Stukeley calls this place *Tamefe*, and it is unquestionable that a Roman military road went through the town, though it was by degrees neglected in the latter times of the empire. Thame was a place of some consequence in the tenth century; for we find that Wulfere, king of Mercia, granted a charter "in the vill called Thama;" and in the year 970, Osketyl, archbishop of York, is known to have died here. In 1010, when the Danes over-run these parts of the kingdom, this town, among others, suffered severely. The Domesday record describes the manor of Thame as a part of the bishop of Lincoln's extensive possessions in Oxfordshire. Leland says, "about Alexander, bishop of Lincoln's time, the town of Tame, being the king's, was given for rent, in fee-farm to the bishop of Lincoln and his successors." To the patronage of the bishops the town was indebted for numerous advantages. By them the church was erected, the vicarage and a prebend endowed, and a neighbouring abbey reared. Through their interest the fairs and market were granted; and Henry Lexington, bishop in Henry the Third's reign, rendered an important service, by turning the high road through the middle of the town. Thame continued dependant on the bishops till the reign of Edward VI., when the fee was dismembered of many of its valuable possessions. Sir John Williams obtained a grant of the estate, which descending by marriages to the family of Bertie, it became veiled in the earls of Abingdon, the present possessors. During the civil wars of the seventeenth century, Thame was surrounded by garrisons of the contending parties, and consequently experienced its full share of the miseries of that period. The town consists principally of one long and spacious street, gently rising from the river. The church is a large, well-built structure, of the cruciform description, and comprises a nave, two aisles, a north and south transept, and a chancel; with an embattled tower supported by four massy pillars. The interior exhibits numerous tombs and memorials of families once important in this neighbourhood. Near the church are the remains of the prebendal house, which evince considerable former grandeur, and consist of nearly three sides of a quadrangle. A school, once of great celebrity, was founded here by John, lord Williams: the house is a spacious building, and the school of noble dimensions. Through the whole of the seventeenth century, this establishment maintained a high character; but has now fallen into disuse; though the building is in excellent preservation. There is likewise a charity-school of an humble description for the education of twenty-five boys. Thame has a good weekly market on Tuesdays, and two annual fairs: the market is of ancient date, for we find that the prior of Rufford was restrained from holding a market at Haddenham, to the prejudice of that of Thame. In the year 1811, the number of houses was returned as 460; the population as 2328, of which more than half were paupers receiving alms from the parish. By the return of the expenses attending the maintenance of the poor in 1811, those of this parish amounted to 3686*l.*, a sum exceeding the expenditure of any other parish in the county. The parish contains about 4600 acres of land, and is divided into six hamlets or liberties, Old Thame, New Thame, Priest End, Thame Park, Moreton, and North Weston: the town comprises the three first. In Thame park, about a mile from the town, stood an abbey of some importance, established by bishop Alexander in 1138. At the dissolution, the society consisted of an abbot and sixteen monks; and the annual revenue was 256*l.* 1*4s.* 7*d.* The abbey, with all its possessions, was surrendered to the crown by Robert Kyng, the last abbot, who, for his ready compliance, was on the erection of the see of Oxford appointed its first bishop. On the site of

part of the abbey the present mansion was built by Philip, the father of the late lord Wenman. Considerable fragments of the abbey still remain, which are protected by the modern elevation. The park contains about 220 acres, and is skirted with woodland.

Sir John Holt, the celebrated chief justice of the court of king's bench, was born at Thame in 1642, and died in 1709. (See *HOLT, Sir JOHN.*)—*Beauties of England and Wales*, vol. xii. Oxfordshire; by J. N. Brewer.

THAMES, the name of the most important river of Great Britain, is pre-eminently distinguished for its commercial consequence, the scenery, edifices, and towns on its banks; for the bridges which are raised across its channel; for the vast docks, quays, and warehouses which are annexed to it; and for the variety and interest of the historic occurrences which are connected or associated with its name. Yet, though so eminent at the present time, it was neglected in former ages; and it is singular to remark, that its source and early progress have occasioned much doubt and dispute. Some topographers have assigned its origin to a spot in Oxfordshire, near the town of Thame; while others, with more regard to probability and record, have traced its source to a spring near Cricklade, in Wiltshire. In that district three or four streams emerge from the earth, and each of these has been honoured with the appellation of Thames-head: but at present it is very generally admitted, that this name strictly belongs to a fine spring, which rises in the parish of Kemble, in Wiltshire, about five miles N.W. of Cricklade, and two and a half miles S.W. of the town of Cirencester. Some writers state that the spring-head is in the parish of Cotes, and county of Gloucester. As a proof that this stream was designated as the Thames, or Tems, at an early period, we may refer to a Saxon charter of Malmesbury Abbey, wherein it is named "Temis," as the boundary of certain lands. Again, some of the old Monkish historians state that the Danes crossed the Thames at Cricklade in the early part of the tenth century.

It has been erroneously said, that the name of this river is the *Isis* till it arrives at Dorchester, and receives the waters of the Thame, where it attained the compound name of *Thamesis*. Some old Oxford poets have given currency and celebrity to this story. Pope, in his "Windfor Forest," speaking of the union of various streams with this river, thus sings:

"First the famed authors of its ancient name,  
The winding Isis, and the fruitful Thame;  
The Kennet swift, for silver eels renowned;  
The Loddon slow, for verdant alders crowned;  
Cole, whose dark streams his flowery islands lave,  
And chalky Wey, that rolls a milky wave."

Denham, the poetical encomiast of "Cooper's Hill," thus characterises the Thames.

"My eye descending from the hill, surveys  
Where Thames among the wauton vallies strays.  
Thames the most loved of all the Ocean's sons  
By his old sire to his embraces runs;  
Hasting to pay his tribute to the sea,  
Like mortal life to meet eternity."

The nature of the present work will not allow of a particular description of the course of this river, with brief accounts of all the prominent objects on its banks. It must suffice to specify the names of the towns, chief seats, and prominent features; and refer to the former, under their respective names in the Cyclopaedia, for further information, and to such books wherein the best accounts are to be obtained. One characteristic of this river is entitled to notice; and which

shews, that at the original formation of thurs, and subdivision of lands in England, the Thames was at that time a noted and considerable stream. From the town of Cricklade, to its junction with the sea at Sheerness, this river is a boundary, or natural line of separation, to counties. Soon after its source, it divides the counties of Wilts and Gloucester; next, those of Oxford and Berks, and Buckingham and Berks; afterwards Middlesex and Surrey; and, lastly, Kent and Essex. The Thames is also a navigable river nearly the whole of its course, and thus affords an easy and cheap passage for heavy goods from the ocean, and the port of London, to the interior parts of the island. By means of a canal, extending from the town of Lechlade, in a north-westerly direction, to the river Severn, the latter great western river and the Bristol Channel are joined by a navigable course to the English Channel. See *CANAL, THAME, and SEVERN.*

As nearly the whole course of the Thames is through a plain or level country, we find its current is consequently slow and irriouous: for fifteen or twenty miles it is only a narrow and small stream, but after receiving the waters of several rivulets, it assumes a river-like appearance at Lechlade, and is capable of sustaining barges of 100 tons burthen. From that town (about 138 miles by water from London) to Sheerness, it is strictly a navigable river. In its course to the sea, the following rivers, besides several smaller streams, pour their waters into the Thames: the Wainrush, Evenlode, Cherwell at Oxford, Thame, Kennet, Loddon, Coln, Wey, Mole, Brent, Lea, Roding, Dart, and Medway.

The following cities, towns, and large villages are seated on the banks of this river: *viz.* the cities of Oxford, London, and Westminster; the towns of Cricklade, Lechlade, Abingdon, Wallingford, Henley, Great Marlow, Maidenhead, Windsor, Staines, Kingston, Richmond, Brentford, Greenwich, Woolwich, and Gravesend; the villages of Pangbourn, Wargrave, Eton, Datchet, Old Windsor, Shepperton, Walton, Sunbury, Moulsey, Hampton and Hampton-Court, Twickenham, Isleworth, Barnes, Chiswick, Fulham, Putney, Hammermith, Chelsea, Blackwall, &c. The banks of this river are also ornamented with the palaces of Windsor, Hampton-Court, Kew, Fulham, and Lambeth: likewise the following distinguished seats of English nobility and gentry, besides several smaller villas, &c.; Nuneham-Courtney, Basildon House, Combe Lodge, Purley, Park Place, Fawley Court, Culham Court, Temple House, Harleyford House, Bisham Abbey, Taplow, Cliefden, Cookham, The Willows, Beaumont Lodge, Oatlands, Garrick's Villa and Pope's Villa at Twickenham, Strawberry Hill, Thames-Ditton, Marble-Hill Cottage, the duke of Buccleugh's, lord viscount Sidmouth's, and Mr. Keen's at Richmond, Keppel House, Sion House, Brandenburg House, and Ingress. Among the numerous bridges which cross this national river, the following are justly noted either for their beauty or extent. The first stone bridge on its course is at Ensham, and the next at Lechlade; Oxford, Abingdon, Shillingford, Wallingford, Caversham, Henley, Maidenhead, Eton, Staines, Walton, Kingston, Richmond, Kew, Fulham, Battersea, Vauxhall, (finished 1816,) Westminster, the Waterloo and Southwark (now erecting from designs by that scientific enigneer, John Rennie, esq.), Blackfriars, and London. The last six may be said to belong to the metropolis. The jurisdiction of the lord mayor of London over the river Thames, extends from Coln-Ditch, near Stains, to Yendal or Yenlech, near Sheerness, and also includes parts of the rivers Lea and Medway. A very interesting account of the scenery and various objects on this river, with numerous beautiful etchings by

W. B. Cooke, and George Cooke, is published in a work in 2 vols. entitled "The Thames, or Graphic Illustrations of Seats, Villas, &c. on the Banks of that noble River." See also an account of the "Police of the River Thames," by P. Colquhoun, esq. a magistrate of London: 8vo. 1800; and Skrine's "Account of Rivers of Note in Great Britain," 8vo. 1801. S. Ireland published "Picturesque Views on the River Thames," 2 vols. imp. 8vo. Boydell also published a work in 2 vols. folio, consisting of history and description by Dr. Combe, and views from drawings by Farrington.

Under the word CANAL will be found an ample account of the commerce and navigation of this river, divided under the heads of THAMES RIVER (*lower part*); THAMES RIVER (*middle part*); THAMES and ISIS NAVIGATION; THAMES and MEDWAY CANAL; and THAMES and SEVERN CANAL.

THAMES, a river of New Zealand. Capt. Cook, Mr. (now Sir Joseph) Banks, and Dr. Solander, sailed up this river in a pinnace; at about fourteen miles from the entrance, it is as wide as the Thames at Greenwich, and the tide at flood is as strong; it is not quite so deep, but has water enough for vessels of more than a middle size, and a bottom of mud so soft, that nothing could take damage by running ashore. The course is from south to north, and the entrance between Cape Colville and Point Rodney.—Also, a river of Upper Canada, which runs into lake St. Clair, N. lat. 42° 45'. W. long. 82° 10'.—Also, a river of Connecticut, which runs into the sea, 4 miles below New London.

THAMESIS, called *Jamissa* by Ptolemy, in *Ancient Geography*, a river of the isle of Albion. See THAMES.

THAMETHIS, a town of Egypt. See DAMIETTA.

THAMMUZ, in *Mythology*, is a name under which the Phœnicians worshipped Adonis or Osiris.

THAMMUZ, in *Chronology*, a name given by the Jews to the tenth month of the civil year, containing twenty-nine days, and answering to our June.

THAMNA, in *Ancient Geography*, a celebrated town of Palestine, on the road from Diospolis to Jerusalem. It was the capital of the Thamnitic toparchy.

THAMNATH-SAAR, a town of Palestine, in Samaria, in the tribe and upon the mount of Ephraim, N. of mount Gaas. This town was built by Joshua, and his tomb was there in the time of Jerome.

THAMNERIA, a town of Asia, in Media, in the neighbourhood of the country belonging to the Cadusii. Xenophon.

THAMNIUM, in *Botany*, *θαρνιον*, a little shrubbery, from *θαμνος*, a shrub, a name chosen by Ventenat, in his *Tableau du Regne Végétal*, v. 2. 35, for the shrubby kinds of Lichen, of which he makes a genus. Its character is

Stems branched in the form of a shrub. Tubercles fungous, coloured.

*Lichen rangiferinus*, and *L. Roccella*, are mentioned as species of this genus, which is now, like the rest of the author's labours in this department, disregarded, the whole tribe having been so much better studied and arranged by Acharius. See LICHENES.

THAMNOCHORTUS, so called by Bergius, from *θαμνος*, a shrub, and *χορτος*, a grass, alluding to the hard shrubby habit, and natural affinity, of the plant. Berg. Cap. 353. t. 5. f. 8. This genus is now sunk in RESTIO (see that article); and the particular species is *R. scariosus* of Thunb. Prodr. 15, and Willd. Sp. Pl. v. 4. 723, though those authors have used *Thamnochortus* as the specific name of another plant, immediately preceding this in Willdenow, who enumerates thirty species of *Restio*.

THAMSBRUCK, or THOMASBRUCK, in *Geography*, a town of Saxony, in Thuringia; 8 miles S.E. of Mulhausen. N. lat. 51° 5'. E. long. 16° 42'.

THAMUNDACANA, in *Ancient Geography*, a town of Asia, in Interior Libya, S. of the river Niger. Ptol.

THAMYRIS, a town of Mœsia, near the Danube. It was built, according to Jornandes, by Thamyris, queen of the Getæ.

THAMYRIS, in *Mythology*, called by Homer *Κιθαρηνη*, one who plays on the cithara, was the son of Philammon. (See his article.) Plutarch, in his Dialogue on Music, tells us that Thamyris was born in Thrace, the country of Orpheus, and had the sweetest and most sonorous voice of any bard of his time. Homer, in his catalogue of ships, where he speaks of the cities under the dominion of Nestor, mentions Dorion as the place where Thamyris contended with the Muses, whom he had the arrogance to challenge to a trial of skill in poetry and music. The conditions and consequences of this contention are fully described by the poet.

“ And Dorion, fam'd for Thamyris' disgrace,  
Superior once of all the tuneful race,  
Till, vain of mortals empty praise, he strove  
To match the feed of cloud-compelling Jove!  
Too daring bard! whose unsuccessful pride  
Th' immortal Muses in their art defy'd:  
Th' avenging Muses of the light of day  
Depriv'd his eyes, and snatch'd his voice away;  
No more his heav'nly voice was heard to sing,  
His hand no more awak'd the silver string.”

Iliad, book ii.

Homer availed himself of the popular story concerning the blindness of Thamyris, and embellished it by his versification. Probably the whole allegory of this blindness had its rise from his having injured the organ of sight by too intense an application to the study of music and poetry. And it is the opinion of Pausanias, that there was no other difference between his misfortune and that of Homer, than that Thamyris was wholly silenced by it, and Homer, without being discouraged, continued his poetical and musical occupation long after his blindness.

THAN, in *Geography*, a town of Hindoostan, in Guzerat; 55 miles N.N.E. of Junagur.

THANÆ, in *Ancient Geography*, a town of Palestine, in the half-tribe of Manasseh, on this side of Jordan.

THANE, or THAIN, *Thanus*, the name of an ancient dignity among the English, or Anglo-Saxons.

Skene makes thane to have been a dignity equal with that of the son of an earl: Camden will have it, that thanes were only dignified by the offices which they bore.

There were two kinds or orders of thanes; the *king's* thanes, and the *ordinary* thanes. The first were those who attended our English-Saxon kings in their courts, and who held lands immediately of the king: whence, in *Domesday-book*, they are promiscuously called *thani*, and *servientes regis*. Soon after the Conquest this name was disused; and instead of it, they were called the *king's barons*, *barones regis*.

Their origin is referred to king Canutus, who, taking the chief of the Danish nobility, to the number of three thousand, for his guard, and arming them with battle-axes and sabres with gilt handles, called them *thing lith*, from the two Danish words *thing* or *thein*, *body of nobility*, and *lith*, *order of battle*.

The *ordinary* thanes, or *thani minores*, were the lords of manors, who had particular jurisdiction within their limits, and over their own tenants.

These changed their name for that of barons; and hence their courts are called *courts baron* to this day.

In old authors, charters, &c. we also meet with thane as signifying

signifying a nobleman; though sometimes only a freeman, and sometimes a magistrate.

**THANE** *Lands*, were lands granted by charter of the Saxon kings to their thanes.

**THANET**, *Isle of*, in *Geography*, is a tract of land on the southern coast of the county of Kent, England, consisting of about 27,000 acres, and is separated from the remaining part of the county by the narrow channel of the river Stour, and the smaller stream called the Nethergong. The marshes which border these streams are extensive, and afford rich pasturage for cattle, but the higher grounds are principally appropriated to the growth of corn. The isle is in shape a long oval, being about nine miles in length from east to west, and nearly five miles broad from north to south. Solinus, who is quoted by Camden, calls it Athanatos, and in some copies Thanatos, which probably gave origin to the Saxon appellation Tenet, or Tanetland; though Lewis derives this from Tene, a fire or beacon; and he supposes the isle to have been so named on account of the beacons or fires which were kept here to give notice of Danish or other pirates, to whose ravages it was greatly exposed. Thanet is bounded on the north and east sides by the ocean; a circumstance which, connected with the salubrity of its air, and its convenient distance from the metropolis, has led to the establishment of several watering-places; and these, in the summer and autumnal seasons, occasion a continual influx of visitants, whose expenditure adds greatly to the wealth of the fixed inhabitants. The chalk cliffs which surround the coast abound in fossils; and among them, the cornua ammonis has been found, measuring upwards of three feet in diameter. The whole of Thanet is divided into the two capital manors of Minster and Monkton, by St. Mildred's Lynch, a narrow strip of land, left unploughed, and extending quite across the isle, from Westgate by Woodchurch, to Sheriff's Hope near Monkton. The isle anciently contained eleven parishes; but those of Sarre and All Saints have been united to St. Nicholas, and that of Woodchurch to Birchington. The parishes of Minster, Monkton, and Stonar, with parts of those of St. Nicholas and St. Lawrence, are under the jurisdiction of two constables; the other parishes, namely St. John's, including the town of Margate; Birchington, with Gore's End, St. Peter's, and Wood or Woodchurch, the ville of Ramsgate, and the ville of Sarre, with the remainder of St. Nicholas and St. Lawrence, are all members of, and subject to the controul of the ports of Dover and Sandwich. The population return of the year 1811 stated the inhabitants of the isle to be 16,156; the number of houses 3209. (See MARGATE, RAMSGATE, and RECVLVER.)—*Beauties of England and Wales*, vol. xiii. Kent; by E. W. Brayley.

**THANN**, or **DANN**, a town of France, in the department of the Upper Rhine; 13 miles N.N.E. of Befort.

**THANN**. See **TANNA**.

**THANNHAUSEN**, or **TANNHAUSEN**, a town of Germany, in the circle of Swabia, and principal place of a lordship of the same name, on the river Mindel; 14 miles N. of Mindelheim.

**THANNURIS**, in *Ancient Geography*, a town of Asia, in Osrhoene; and another in Mesopotamia.

**THANTIA**, a town of Palestine, in Batanæa, eastward towards the mountains, S.E. of Adraa.

**THANWALD**, in *Geography*, a town of Silesia, in the principality of Breslau; 13 miles N.W. of Breslau.

**THAOUAOUIS**. See **TAVAVIS**.

**THAPUA**, in *Ancient Geography*, a town situated in the interior of Arabia Felix. Ptol.

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**THAPSA**, a town of Palestine, in the tribe of Ephraim.

**THAPSACUS**, or **AMPHIPOLIS**, a large and flourishing town of Asia, in Syria, on the banks of the Euphrates. When Alexander, after leaving Egypt, came to Thapsacus, he found here two bridges over the Euphrates. Xenophon tells us that Cyrus sojourned here five days; and that it was here that he informed the Greeks of his intention to march to Babylon. The soldiers mutinied, but were afterwards appeased by his promises. Thapsacus is now a village, called "El-Der." The channel of the river is here about half a mile in breadth, and would appear to have been fordable from the earliest times to the present day. It was passed on foot by Cyrus and his whole army, and, as some say, by that of Alexander the Great.

**THAPSIA**, in *Botany*, a name adopted from the ancient Greeks, whose  $\theta\alpha\psi\iota\alpha$ , if not precisely a species of our present genus, was certainly, like it, a large umbelliferous plant, yielding a gummy exudation, and bearing yellow flowers, succeeded by broad seeds. Such is the description given by Dioscorides, who moreover adds, that his  $\theta\alpha\psi\iota\alpha$ , so named from the island of Thapfos, where it grew, was in every respect like *Ferula*, but with a more slender stem, and leaves nearly akin to fennel. The root was large; white within, black on the outside, with a thick acrid bark. He attributes various virtues to its gum or juice, either taken as a purge, in oppressions of the chest; or applied externally, along with honey, wax, or frankincense, for cutaneous complaints, tumours, &c.—Linn. Gen. 144. Schreb. 193. Willd. Sp. Pl. v. 1. 1464. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 156. Sm. Prodr. Fl. Græc. Sibth. v. 1. 201. Juss. 220. Tournef. t. 171. Lamarck Illustr. t. 206. Gært. t. 21.—Class and order, *Pentandria Digynia*. Nat. Ord. *Umbellatæ*, Linn. *Umbellifera*, Juss.

**Gen. Ch.** *General Umbel* large, with about twenty rays, of nearly equal length; *partial* of as many, nearly equal, rays. *Involucrum* none, neither *general* nor *partial*. *Peduncle* scarcely discernible. *Cor.* *Universal* uniform; all the flowers fertile; *partial* of five lanceolate incurved petals. *Stam.* Filaments five, capillary, the length of the corolla; anthers simple. *Pist.* Germen inferior, oblong; styles two, short; stigmas obtuse. *Peric.* Fruit oblong, encompassed longitudinally with a membranous border, separable into two parts. *Seeds* two, very large, oblong, convex, pointed at each end, encompassed at each side with a large, flat, entire-edged border, which is emarginate at each extremity.

**Ess. Ch.** *Involucrum* neither general nor partial. Fruit oblong, encompassed with a membranous border. Petals uniform, lanceolate, inflexed. Flowers all fertile.

1. *Th. villosa*. Villous Deadly Carrot. Linn. Sp. Pl. 375. Willd. n. 1. Ait. n. 1. (Th. prima; Clus. Hist. v. 2. 192. Th. latifolia Clusii; Ger. Em. 1030.)—Leaflets toothed, villous; confluent at the base.—Native of stony ground, in Spain, Portugal, and the south of France. Dr. Sibthorp found it in the fields of Patmos and Cyprus, and Dr. Broussonet at Algiers. The root is perennial, tap-shaped, said to be of an extremely fetid, acrid, and nauseous quality, which has given rise to the English name. Gerarde applies to this species what Dioscorides says of *T. garganica*, that exhalations from the root or plant exulcerate the skin. The stem is three or four feet high, erect, round, smooth, leafy, branched at the top. Leaves large and spreading, twice or thrice pinnate; their leaflets sessile, obtuse, pinnatifid, notched, confluent at the base, in the manner of a fern; hairy on both sides; whitish and downy at the back. Umbels several, stalked, terminal, large, smooth, naked. Flowers yellow, rather small. Fruit about half an inch long, and a quarter broad, with four ribs at

each side, and a thin, brown, membranous double wing at each margin.

2. *Th. fatida*. Stinking Deadly Carrot. Linn. Sp. Pl. 375. Willd. n. 2. Ait. n. 2. (*Th. vulgaris*; Ger. Em. 1031. *Th. vulgaris*, carotæ effigie; Lob. Ic. 780. Morif. sect. 9. t. 18. f. 7.)—Leaflets many-cleft, acute; contracted at the base.—Native of Spain, as well as of Zante and Cyprus. Gerarde had this plant in his garden, and it is still, like the foregoing, to be seen in curious botanical collections, though not very commonly. It differs from the *villosa* in having more finely, acutely, and deeply divided leaflets, which are wedge-shaped, not dilated at the base. The size of the whole plant is smaller, and the *stem* more branched.

3. *Th. Afelepium*. Fine-leaved Deadly Carrot. Linn. Sp. Pl. 375. Willd. n. 3. Sm. Fl. Græc. Sibth. t. 286, unpubl. (*Th. apula, foliis millefolii*; Morif. sect. 9. t. 18. f. 9. *Panax Afelepium* Dioscoridis et aliorum, gummiferum; Column. Ecphr. p. 1. 87. t. 86.)—Leaves digitate; leaflets doubly pinnate, in many bristle-shaped segments.—Native of the south of Italy, and of the Levant; unknown in our gardens. Dr. Sibthorp met with this plant in Greece, Rhodes, and near Constantinople. The *root* is tapering, perennial, brown, gummy, crowned with bristly fibres. *Stem* solitary, erect, a yard high, slightly branched, round, smooth, the thickness of a goose-quill, almost destitute of foliage, except about the bottom. *Leaves* on long stalks, of five principal unequal leaflets, radiating from the base, which are doubly, or almost triply, pinnate, their small leaflets being divided very deeply into fine acute segments, one-eighth of an inch long, smooth, and of a bright green. *Flowers* yellow, in spreading long-stalked umbels. *Petals* dilated at the base, so as to be, from the inflexion of the point, almost heart-shaped. *Seeds* with broad, linear, obtuse wings.

4. *T. garganica*. Garganian, or rather Greek, Deadly Carrot. Linn. Mant. 57. Willd. n. 4. Ait. n. 3. Gouan. Illustr. 18. t. 10. Sm. Fl. Græc. Sibth. t. 287, unpubl. (*Th. thaliæri folio*; Magn. Monsp. 287. t. 286. *Th.* five Turbith garganicum, femine latissimo; Bauh. Hist. v. 3. p. 2. 50.)—Leaves radiato-pinnate; leaflets deeply pinnatifid, with linear decurrent segments. Native of Barbary, the south of Italy, and the Levant. Dr. Sibthorp finding it very common throughout Greece, and the neighbouring islands, justly concluded this species to be the true  $\theta\alpha\lambda\alpha\iota\alpha$  of Dioscorides, with whose description it agrees better than any of the rest. It is a stately perennial plant, whose seeds were probably obtained from the garden of Montpellier, by our British cultivators, towards the year 1680. The firm round leafy *stem*, as well as the sheathing bases of the *footstalks*, and the ripening *seeds*, are tinged with a fine glaucous purple. *Leaves* large, deep green; smooth above; glaucous, and sometimes hairy, below; their segments near an inch long, linear, entire. *Common footstalks* long, round, sometimes very hairy. *Umbels* very large, yellow. *Petals* lanceolate, involute. *Fruit* an inch long, with broad, shining, brown wings; its sides finely ribbed.

For *Th. trifoliata*, Linn. Sp. Pl. 376, see SMYRNIUM n. 6, *cordatum*.

*Th. polygama*, Desfont. Atlant. v. 1. 261. t. 75. Mart. Mill. Dict. n. 6, found on the sea-coast of Barbary, cannot belong to this genus, having a general, as well as partial, *involucrum*, and abortive central *flowers*. It should seem to be a LASERPITIUM. See that article.

THAPSIS, in *Ancient Geography*, a river of Scythia, in the environs of the Palus Mæotides, according to Dioscorus Siculus.

THAPSOS, in the *Materia Medica of the Ancients*, a name given to a kind of wood of a pale yellow colour, used of old in dyeing of linen and woollen cloths. The Greek *Thapsos* signifies a pale dead yellow colour, and is applicable either to the substance, or the juice or tincture of all these.

The people of Crete at this time use the lycium-wood in dyeing a yellow colour, and it is probable that the *thapsos* was this very tree. Dioscorides tells us, that the wood of this tree was also used in his time to tinge the hair yellow, which was a favourite colour with the Greeks. The lycium is of a colour somewhat deeper than our box-wood, and parts with its stain so easily, that it seems very proper for such a purpose.

THAPSUM, among the old *Roman Writers*, a common name for the verbascum, or mullein; but as there were many other plants, very different in their nature, yet whose names resembled this; such as the *thapsia*, or deadly carrot, and the *thapsun* or *genistella tinctoria*; it was soon found necessary to add some other name, and it was then called *thapsun barbatum*, or *barbassum*.

The reason of the *genistella* being called *thapsun*, was, that its flowers were yellow, and were used to colour the ladies' hair; that being the favourite colour of those days. The flowers of mullein are yellow, and seem more fit for the colouring of the hair than those of the *genistella*; their colour being more easily separated, and continuing on so well, that the glovers of many parts of England use them in the season for colouring their yellow gloves.

It is probable, that the ladies of old used this, as well as the *genistella*, for this purpose: and it might hence obtain the common name *thapsun*. The other part of its distinction, *barbatum*, seems owing to the leaves being so coloured with a woolly down that they look bearded. And when this word is written *barbassum*, it may probably be given as the name of some of those species of mullein which are not hairy, as our black or sage-leaved mullein, and be a corruption of the word *verbascum*. This black mullein has no less title than the white or bearded kind to the name *thapsun*; its flowers being of a yet finer yellow than those of that kind, and being as fit for the use of staining. The glovers in some places use this species for their leather-gloves.

THAPSUS, DEMASS, in *Ancient Geography*, a maritime town of Africa, upon a tongue of low land, S. of the Lesser Leptis. The place abounds with ruins.

THAPSUS, or *Tapsus*, in *Botany*, see VERBASCUM. This name seems to have originated with Gerarde, who gives no explanation, nor do we find any authority for the opinion of De Theis, that it alludes to the isle of Thapsos, as the native country of the plant. Such indeed is the acknowledged derivation of THAPSIA, see that article; with which this *Verbascum*, a  $\theta\lambda\alpha\mu\sigma$  of the Greeks, has no relationship whatever.

THAR, in *Ancient Geography*, a town of Arabia Felix, belonging to the people called Themi.

THARAND, in *Geography*, a town of Germany, in the circle of Upper Saxony, and circle of Erzgebürg; 10 miles E.N.E. of Freyburg.

THARE, in *Ancient Geography*, a place of the encampment of the Israelites, whence they went to Methea. (Numb. xxxiii. 27.) Thare, situated in Arabia Deserta, was the 24th station of the Israelites.

THARELA, a town of Palestine, in the tribe of Benjamin.

THARGELIA,  $\theta\alpha\rho\gamma\epsilon\lambda\iota\alpha$ , in *Antiquity*, an Athenian festival in honour of the sun, and his attendants, the

Hours:

Hours: or, as others think, of the Delian Apollo and Diana. For an account of the ceremonies of this solemnity, see Potter Archæol. Græc. lib. ii. cap. 20. tom. i. p. 400. seq.

**THARGELION**, *Θαργηλιών*, in *Chronology*, the eleventh month of the Athenian year. It contained thirty days, and answered to the latter part of our April, and the beginning of May.

It took its name from the festival Thargelia, kept in it.

**THARNAU**, in *Geography*, a town of Silesia, in the principality of Neisse; 1 mile N. of Grotkau.

**THARO**, in *Ancient Geography*, an island, situated, according to Ptolemy, in the Persian gulf.

**THARPA**, a town of India, beyond the Ganges, in the Golden Chersonesus. Ptolemy.

**THARRANA**, a town of India, beyond the Ganges, on the coast of the Great gulf. Ptol.

**THARSIA**, a town of Africa propria, or one of those which Ptolemy points out between Bagradas and the town of Thabraca.

**THARSIS**, **THARSHISH**, or *Tarshish*. See **OPHIR**.

**THASO**, in *Geography*, an island of the Grecian Archipelago, situated in the gulf of Contesa, anciently called *Æria*, or *Æthria*, being famous, even to a proverb, for its rich gold-mines. It has a town or village of the same name. N. lat. 40° 34'. E. long. 42° 30'.

**THASSUS**, **THASSOS**, or *Thasus*, in *Ancient Geography*, an island situated on the coast of Thrace, opposite to the mouth of the river Nestus. Thasus, son of Agenor, king of the Phœnicians, is said to have remained many years in this island, to have peopled it, and to have given it his name. It was afterwards increased by a Greek colony. The Athenians made themselves masters of this island, and treated the inhabitants with great rigour; but they were expelled by the Macedonians, and these again by the Romans.

**THATCH**, in *Rural Economy*, prepared straw which is intended to be laid on the top of a building, rick, &c. to keep out the wet. There are many different sorts of materials that may be made use of as thatch, but those which are most commonly employed are the straw of different sorts of grain, as wheat, rye, &c. reed, stubble, heather, &c. The straw of wheat and rye, when well prepared and laid, probably forms the neatest and most secure covering for general purposes. It has indeed been stated, that the most suitable material for the purpose is that of good wheat-straw that has been much bruised in threshing out the grain. But when this cannot be had in sufficient quantity, rye-straw may be substituted in its place; however, from its rough and stubborn quality, it is neither so neat in its appearance, so durable, nor affords so secure a covering. And that barley and oat straw are sometimes made use of for the purpose, but they form very indifferent coverings, and such as are not by any means lasting. The former, when strong, is however preferable to the latter.

The reed is a highly valuable article for the purpose of thatch, where a lasting roof is required; but is much too expensive and stubborn for common purposes. It has been remarked by Mr. Marshall, in the *Rural Economy of Norfolk*, that there, the favourite material for roofs, and that which is the most eligible after good slate for farm purposes, is reed. And that a reed roof properly laid, will lie fifty years without touching; and thirty or forty more, with only adjusting (driving) it, and levelling the hollows with a little fresh reed. At an hundred years old it may be relaid; and will then, if laid upon the upper parts of the roof, last through a considerable part of another century. The reed is, he says, principally cut from the margins of

the *broads*, (large pieces of water,) and is carried, perhaps, forty or fifty miles into the central and northern parts of the county. And it is added, that though a covering of reed is, in the first instance, costly; when its durability, and the high degree of preservation in which it keeps the roof, are taken into the account, it is of all other the cheapest covering; besides its being, whether in the extreme of heat or cold, the most comfortable.

And it is stated, that the price of reed, in the place of its growth, is from three pounds to three guineas a hundred, containing six score fathoms; each fathom (composed of five or six sheaves) measuring six feet in circumference. A hundred of reed will cover five squares of roof: the laying is a halfpenny a yard, or four shillings and twopence a square; and the tar rope and rods for fastening it on cost eighteen pence a square: so that a covering of new reed costs about eighteen shillings a square, containing 100 square feet; besides carriage, and what is called *roofing*; namely, a cap of wheat-straw placed upon the ridge, in a somewhat similar manner, and for the same purpose, as ridge-tiles are put on. This capping, which is done in a most effectual, but in a tedious and expensive manner, costs, in materials and workmanship, about sixteen pence each foot in length: which, upon a roof of sixteen feet and a half spar, is an additional expence of four shillings each square of reeding.

With regard to the carriage, it is in proportion to the distance. Taking twenty miles as a medium distance, and one shilling a mile as a medium price; the expence is, he says, twenty shillings a 'load' of sixty fathoms, or forty shillings a hundred; which laying five squares is a further addition of eight shillings a square: therefore, the whole expence of a covering of reed fetched twenty miles, may, he supposes, be laid at thirty shillings a square. The writer has been thus minute, he says, in his account of this material, as it has been much overlooked in other districts, where it may be found useful.

This material is a great deal more expensive in every respect which has any relation to this object, at the present time, than it was then.

And with respect to the stubble, it is said to be a material that may be made use of with propriety and advantage in some situations. This is the stubble of such wheat or other crops as have been cut at a great height; which, after being mown close to the ground and raked up, serves this purpose, especially for the more common purposes of the farm, such as covering hay and straw stacks, &c. the thatching potatoes when hogged in the ground, and many other such cases.

The last material, heather, is also found a highly valuable article for the purpose of thatch in districts where it grows in abundance, as it is extremely durable. See **HEATHER**.

The thatch which is removed from the stacks or buildings may be used as a litter for various purposes.

The modes of preparing and applying these different matters to the roofs of stacks and buildings will be pointed out in speaking of the operation of securing such roofs by means of such substances. See **THATCHING**.

Where straw of the rye or wheat kind is very strong, it is often termed *reed* or *straw reed* by the thatcher, and used for covering large hay-stacks very commonly in many districts.

**THATCHAM**, in *Geography*, a village and parish in the hundred of Reading and county of Berks, England, is situated 3 miles E. from Newbury, and 53 miles W. from London. It appears to have been formerly a town of some consequence, from the *Domesday Survey*, and other re-

cords, in which it is described as an ancient borough ; but it does not appear ever to have sent representatives to parliament. From a very early period it had a market on Sundays, which was confirmed to the abbot and convent of Reading by a charter of Henry II. The market-day was changed by Henry III. in 1218 to Thursday ; but the market has long been discontinued. Two annual fairs are still held. The manor of Thatcham was given to the abbot and convent of Reading by Henry I. At the dissolution it was granted, in 1539, to John Winchcombe, son of the celebrated Jack of Newbury : it is now the property of William Mount, esq. of Wasing. A charity-school was founded here, in 1707, by lady Frances Winchcombe, who endowed it with 53*l.* *per annum*. The school had been long discontinued, and its revenue lost to the parish ; when Mr. Thompson, a late vicar, instituted a suit for their recovery, and after a long contest succeeded in the re-establishment of the school, with an income for the master increased to 200*l.* *per annum* ; forty boys are now clothed and educated, and six of them annually apprenticed with premiums of 10*l.* each. The parish of Thatcham is the most extensive of any in the county, excepting Lamborn, and includes six townships. The population, according to the parliamentary report of the year 1811, was estimated at 2104 ; the number of houses at 424.—Lysons's "Magna Britannia," vol. i. Berkshire.

THATCHER, a rock in the English Channel, on the north side of Torbay.

THATCHER, in *Rural Economy*, a person who performs the business of thatching.

THATCHING, the operation of covering the roofs of buildings, stacks, and other things, with some sort of thatch. For this purpose, articles of the straw kind are prepared in the following manner : After being well moistened with water, they are drawn out in handfuls perfectly straight and even into regular lengths, and the short straw separated from them, leaving them placed in convenient ranges for forming bundles to be carried to the thatcher by the person who has the ferving of him.

In regard to the application of the thatch to stacks of hay or corn, there are different methods pursued, according to the nature of the materials employed. Where long straw is made use of, the operator or workman usually begins at the eaves or bottom part of the roof, depositing it in handfuls in regular breadths till he reaches the top, the different handfuls being so placed endways as to overlap each other, the upper ends being constantly pushed a little into the bottom parts of the sheaves or other matters. In this manner he gradually proceeds, breadth after breadth, till the whole of the roof is covered, which is usually done to the thickness of about four or five inches. And in order to retain the thatch in its place, short sharp-pointed sticks, termed *prods* in some places, are occasionally thrust in, in a slanting direction upwards ; and sometimes small sticks, often called *spelks*, sharpened at the ends, are bent and thrust in along the top parts and sides. But as the water is apt to follow the course of the sticks, it is perhaps a better practice to make use of ropes of twisted straw for this purpose. In some cases, these are applied only round the bottom parts of the roof and the sides ; while in others, which is a much better and more secure method, they are applied in such a manner over the whole stacks, as to form a sort of coarse net-work of nine or twelve inches in width in the niches, the ends being well fastened either to belt-ropes passed in suitable directions for the purpose, or to different parts of the straw of the stack.

In the application of stubble as a thatch, it is mostly,

after being prepared, put on by sticking one of its ends into the roof of the stack in a regular and exact manner, so as that it may stand out very close and thick ; when the other, with such loose straws as may occur, is to be cut over or pared off, with a very sharp tool for the purpose, so as to form a neat and impenetrable thatch, having the appearance of a newly thatched house roof ; the whole being well secured in its place by short pegs made for the purpose, somewhat in the same way as in the thatch of other stacks.

In the thatching of the roofs of houses or other buildings with any of the different sorts of straw, the materials are to be laid on to a considerable thickness, and firmly secured. They are applied in regular narrow slips, or what in some districts are termed *gangs*, from the eaves of the building to the ridges, the ladder being moved forward as the work proceeds. The thatch is secured by short sharpened sticks, as above, thrust in where necessary. And bended sticks, sharpened at each end, are likewise sometimes made use of near the ridges, being thrust in at each end. In finishing the work, the thatcher mostly employs an iron-toothed rake, with which the whole is raked and trimmed over from top to bottom, so as to render it completely smooth and even, and take away all the short straws, and other irregular matters.

The method of thatching with reed, according to Mr. Marshall, in his account of the Rural Economy of Norfolk, is this : no laths being made use of, in laying it, a little of the longest and stoutest of the reed is scattered irregularly across the naked spars, as a foundation to lay the main coat upon : this partial gauze-like covering is called the "fleaking." On this fleaking the main covering is laid, and fastened down to the spars by means of long rods, provincially "sways," laid across the middle of the reed, and tied to the spars with rope-yarn, or with "bramble bonds," formerly much used, but now pretty nearly laid aside. In laying on the reed, the workman begins at the lower corner of the roof, on his right hand, for instance, and keeps an irregular diagonal line, or face, until he reaches the upper corner to his left, a narrow eaves-board being nailed across the feet of the spars, and some fleaking scattered on ; the thatcher begins to "set his eaves," by laying a coat of reed, eight or ten inches thick, with the heads resting upon the fleaking, and the butts upon the eaves-board. He then lays on his *sway* (a rod about the size of a small edder) about six or eight inches from the lower point of the reed ; whilst his assistant, on the inside, runs a needle, threaded with rope-yarn, close to the spar ; and, in this case, close to the upper edge of the eaves-board. The thatcher draws it through on one side of the sway, and enters it again on the contrary side, both of the sway and of the spar : the assistant draws it through, unthreads it, and with the two ends of the yarn makes a knot round the spar ; thereby drawing the sway, and consequently the reed, tight down to the roof : whilst the thatcher above, beating the sway and pressing it down, assists in making the work the firmer. The assistant having made good the knot below, he proceeds with another length of thread to the next spar, and so on, till the sway be bound down the whole length ; namely, eight or ten feet. This being done, another stratum of reed is laid on upon the first, so as to make the entire coat eighteen or twenty inches thick at the butts ; and another sway laid along, and bound down, about twelve inches above the first.

The eaves being thus completely set, they are adjusted and formed, not square with the spars, but nearly horizontal : nor are they formed by cutting, but by "driving" them with a "legget," a tool made of a board eight or nine inches square, with a handle two feet long, fixed upon the back of it,

it, obliquely, in the manner of the tool used by gardeners in beating turf. The face of the legget is set with large-headed nails, to render it rough, and make it lay hold of the butts of the reeds. Then another layer of reed is laid on, and bound down by another sway, somewhat shorter than the last, and placed eighteen or twenty inches above it; and above this another, and another, continuing to shorten the sways, until they be brought off to nothing, and a triangular corner of thatching formed. After this the sways are used their whole length, whatever it happens to be, until the workman arrives at the finishing corner.

In order to give a finish to the ridge, a *cap* (provincially a "roof") of straw is set on in a masterly, but in an expensive manner. In this operation, the workman begins, it is observed, by bringing the roof to an angle, with straw laid the long way upon the ridge, in the manner in which a rick is tapt up; and to render it firm, to keep it in its place, and to prevent the wind from blowing it off, or ruffling it, he pegs it down slightly with "double broaches;" namely, cleft twigs, two feet long, and as thick as the finger, sharpened at both ends, bent double, and perhaps with the twisting of the crown, and perhaps barbed, by partial chops on the sides, to make them hold in the better. This done, the workman lays a coat of straight straw, six or eight inches thick, across the ridge; beginning, on either side, at the uppermost butts of the reed, and finishing with straight handfuls evenly across the top of the ridge. Having laid a length of about four feet in this manner, he proceeds to fasten it firmly down, so as to render it proof against wind and rain. This is done by laying a "broachen ligger" (a quarter-cleft rod as thick as the finger, and four feet in length) along the middle of the ridge, pegging it down at every four inches with a double broach, which is first thrust down with the hands, and afterwards driven with the legget, or with a mallet used for this purpose. The middle ligger being firmly laid, the thatcher smooths down the straw with a rake and his hands, about eight or nine inches on one side, and at six inches from the first lays another ligger, and pegs it down with a similar number of double broaches, thus proceeding to smooth the straw, and to fasten on liggers at every six inches, until he reach the bottom of the cap. One side finished, the other is treated in the same manner; and the first length being completed, another and another length is laid, and finished as the first, until the other end of the ridge be reached. He then cuts off the tails of the straw square and neatly with a pair of shears, level with the uppermost butts of the reed; above which the cap (or most properly the *rooflet*) shews an eaves of about six inches thick. And lastly, he sweeps the sides of the main roof with a bow of holly, when the work is completed. This, when well performed, must be a durable and useful mode of thatching, and at the same time one which has a neat appearance.

In thatching with heather, that material mostly undergoes some sort of preparation, so as to render it as equal as possible in size and strength, being laid and fastened upon the roofs then in somewhat the same manner as that of straw. It is afterwards swept, cleaned, and finished off in a neat and exact manner, so as to look extremely well.

In some of the more exposed situations in the northern parts of the island, they have other modes and practices of thatching buildings with straw in use, such as performing it with clay, or thin turf and that material.

If the roof be covered with thin turf or divots, the workman is to twist the upper part of the straw into a sort of knot; then, with a stick prepared for the purpose, to force the knot thus formed either under or through the turves or divots, so that it may have a firm hold of the roof; after

which, to spread the lower part of the bundle of straw nicely on the roof, continuing to do the same to the very top of the roof; and then to lay it all over, and begin another tier, gang, or row of the thatch. In this way, the thatch should not be laid thinner than six inches, and when it is laid eight inches thick, it is the more durable. Thin turf, or divots, were originally thought the best foundation; but it has been since found by experience, that they rot the straw, and that straw alone, when pitched on with rope-yarn, lasts much longer. If straw alone be used in this manner, it will last twenty years; but the straw must be laid on two inches thicker than when clay is added. A roof that is thatched with divots, straw, and clay, in the common way, will last from seventeen to twenty years; and is also capable of being mended without raising any part of the roof that is entire. The above kind of roof is much less liable to catch fire than straw roofs without clay. The clay that answers the purpose best is that which has a due proportion of sand in it. If stiff clay should be used, it will be necessary to add one cart-load of sand to every two of the clay.

This sort of claying may, of course, be useful and advantageous in thatching the roofs of buildings in many situations and places.

THAU, in *Geography*, a lake of France, in the department of the Herault, near the Mediterranean, between Frontignan and Agde.

THAUANA, in *Ancient Geography*, a town situated in the interior of Arabia Felix.

THAUBA, a town in the interior of Arabia Felix. Ptol.

THAUGHTS, or THOUGHTS, in a *Boat*, are the benches on which the rowers sit to row.

THAUMASIVS MONS, in *Ancient Geography*, a mountain of Arcadia, N.W. of Mantinea, above the river Moloffus.

THAUMATURGUS, formed from θαυμαζω, *wonderful thing*, and εργον, *work, worker of miracles*; an appellation which the Romanists gave to several of their saints, eminent for the number and greatness of their miracles.

St. Gregory, called *Thaumaturgus*, or Gregory of Neocæsarea, was a disciple of Origen about the year 223, and afterwards bishop of Cæsarea, in Pontus; and in that capacity he assisted at the first council of Antioch, and at that of Ephesus, against Paulus Samofatenus. St. Leo of Catania is also called *Leo Thaumaturgus*. He lived in the eighth century; and his body is still honoured at Rome, in the church of St. Martin de Tours. St. Francis Paul, and St. Francis Xavier, are the great Thaumaturgi of these last ages.

THAWING, the resolution of ice into its former fluid state, by the warmth of the air.

THAXTED, in *Geography*, an ancient market-town in the hundred of Dunmow, and county of Essex, England, is situated 19 miles N.N.W. from Chelmsford, and 43 miles N.N.E. from London. The town was known in the Saxon times, as the church is recorded to have belonged, in the reign of Edward the Confessor, to the college of St. John Baptist, at Clare, in Suffolk. Thaxted was incorporated by charter of Philip and Mary, which was confirmed by queen Elizabeth; under this the civil government is vested in a mayor, recorder, two bailiffs, and twenty principal burghesses. In the reign of James II. the corporation experienced a temporary suspension; for being served with a writ of quo warranto, the corporate officers, either through fear or poverty, thought fit to retire from their offices. The market was granted by Edward II., but was discontinued for a long period: it has been recently revived, and

is now held on Fridays. Here are also two annual fairs. In the population return of the year 1811, Thaxted was stated to contain 390 houses, occupied by 1733 persons. The church is a very large and beautiful structure, and appears, from the various arms and cognizances on several parts, to have been built at different times in the fourteenth and fifteenth centuries. The whole fabric is embattled, and supported by strong buttresses, terminated by canopied niches, and curiously puffed pinnacles. At the west end is an embattled tower, sustained by buttresses, and surmounted by a neat octagonal spire, rising to the height of 181 feet. The interior consists of a nave, transept, chancel, and side aisles: the arches of the nave are pointed, and supported by eight clustered columns on each side. The expence of the erection of this church was principally defrayed by the noble families of Clare and Mortimer, who then possessed the manor, with some assistance from king Edward IV. A chantry, besides various chapels and altars, were used here before the reformation. The charitable benefactions for the use of the poor inhabitants of Thaxted are considerable. An estate, called Yendleys, deriving its name from Thomas Yendale (who resided on it temp. Henry VI.) was, on his death, vested in trust for his four sons and their issue; and in default of such issue, to be sold for the benefit of the church and poor. The sons all dying childless, the estate was sold 5 Henry VII. and the produce is applied to the support of a school, repairing the church, improving the highways, &c. In 1698, William, lord Maynard, bequeathed 4000*l.* in trust, the produce to be applied for increasing the minister's salary, repairing the church, marrying poor young women, binding out apprentices, and relieving poor people overburdened with children. Among other benefactions are endowments for alms-houses in several parts of the town: one of the buildings appropriated for that purpose is the old chantry-house. The ancient guildhall is now the parish workhouse: the mote-hall is used for a public school.—*Beauties of England and Wales, vol. v. Essex; by J. Britton and E. W. Brayley. Morant's History, &c. of Essex, 2 vols. folio.*

THEA, in *Ancient Geography*, a town of the Peloponnesus, in Laconia.

THEA, in *Botany*, the Tea-tree, a name of barbarous derivation, originating in the Chinese *Tcha*, or Japanese *Tsja*, of which the various nations of Europe have made, according to their fancy, Chaa, Tea, Thé, &c. and which Kæmpfer has formed in Latin into *Thea*. This last has been admitted by Linnæus, for the sake of its Greek orthography, exactly that of *thea*, a goddess, a coincidence highly welcome to those who honour the cordial beverage of tea as it deserves.—*Linn. Gen. 269. Schreb. 361. Willd. Sp. Pl. v. 2. 1180. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 303. Juss. 262. Lamarck Illustr. t. 474. Gært. t. 95.—Class and order, Polyandria Monogynia, Linn. Rather Moradelpbia Polyandria; see Sm. Introd. to Bot. ed. 3. 335. Nat. Oid. Columnifera, Linn. Aurantiis et Meliis affine, Juss.*

Gen. Ch. *Cal.* Perianth inferior, small, of one leaf, in five deep, rounded, obtuse, permanent segments. *Cor.* of one petal; tube none; limb in six, or more, deep, unequal, rounded, concave, imbricated segments, much longer than the calyx; the outer ones smallest. *Stam.* Filaments numerous, about two hundred, thread-shaped, shorter than the corolla, united at the base into a shallow cup-like tube, inserted into the receptacle, and connected with the bottom of the petal; anthers peltate, simple, nearly globose. *Pist.* Germen superior, globose, with three obtuse angles; style triangular, with three furrows, the length of the stamens, splitting into three parts; stigmas three, linear-oblong, de-

flexed. *Peris.* Capsule three-lobed, three-celled, bursting along the upper side of each lobe. *Seeds* solitary, globose, somewhat angular.

Eff. Ch. Calyx in five deep rounded segments. Corolla in six, or more, deep imbricated segments. Capsule superior, three-lobed. Seeds solitary.

Obf. Gærtner remarks that there are rudiments of four or six feeds in each cell of the germen. The genus is, doubtless, nearly related to *CAMELLIA*, (see that article,) and should stand next to it in the artificial, as well as natural system. Whether the connection of the stamens varies, or whether we have sometimes in our gardens Thunberg's *C. Sasanqua* for the true Tea-plant, is extremely difficult to determine. The flowers in England are certainly never so large as in his plate of *Sasanqua*, which latter may possibly be a species of *Thea*, though very distinct from the Linnæan specimens marked *T. Bohea*, and from all we have ever examined in gardens. Plukenet's Fruticis Theæ species altera Sinarum, Amalth. t. 405. f. 3, may belong to this *Sasanqua*. The species of *Thea* are involved in much obscurity. Linnæus was led to describe two, under the popular names of *Bohea* and *viridis*, which he distinguished by the former having six petals, or rather segments of the corolla, and the latter nine. But for these characters he is indebted to Hill, whose authority is little to be relied on. We have never seen perfect specimens of more than one species, which answers to the definition of the *Bohea*, with scarcely any variation; nor do the leaves of common green or black tea, when expanded by hot water, betray any difference in their serratures, veins, or other respects, from that or from each other. The *Pekoe*, whose silky young branches are conspicuous in the tea-chest for their whiteness, agrees in that particular with our garden specimens of *Thea*, and not with *Camellia Sasanqua* sent by Thunberg, for this last is hairy in a very different manner. Such being the state of the case, we can undertake to describe only one species of *Thea*.

1. *T. viridis.* Green Tea. Gært. v. 2. 83. t. 95. f. 1. *Linn. Sp. Pl. 735. Willd. n. 2. (T. bohea; Linn. Sp. Pl. 734. Amœn. Acad. v. 7. 253. t. 4. Willd. n. 1. Ait. n. 1. Thea; Kæmpf. Am. Exot. 605. t. 606. Woodv. Med. Bot. suppl. 116. t. 256. T. chinensis; Curt. Mag. t. 998. T. cantoniensis; Lour. Cochinch. 339. Thé; Barth. Act. v. 4. t. 1. Tea-tree; Letsom Monogr. t. 1.)—Native of China and Japan. The late Mr. John Ellis is said to have first raised it from seed in England, about the year 1768. The shrub is propagated by cuttings, and will bear our winters with a slight degree of shelter, though it rarely flowers, except in a greenhouse or stove. The stem is from three to six feet high, bushy, with numerous, alternate, round, leafy branches, smooth, except at the very extremity, where the youngest shoots are finely silky, with close-pressed hairs. Leaves alternate, on short, thick, channelled, smooth foot-stalks, evergreen, elliptic-oblong, with a blunt emarginate point, copiously serrated, except at the base, with inflexed pointed serratures, smooth on both sides, with one rib and many transverse veins, interbranching towards the margin; paler beneath; their length two or three inches; their breadth about one inch: the young ones finely silky before expansion, with a deciduous point. Stipules none. Flowers axillary, or, on the lateral shoots, nearly terminal, white, not unlike those of a Myrtle, but rather larger, and on short, thick, recurved, round, smooth stalks, usually two together, accompanied by a few alternate, short, ovate, deciduous bractæas. The two outer segments of the corolla, smaller than the rest, are green, or purplish, at the back. Anthers and stigmas yellow.*

For the economical history of this plant, see TEA. We have

## THEA.

have been greatly at a loss for a specific name, and have adopted *viridis* to avoid any needless change, thinking it rather preferable to *Bohea*, which is a partial name, and of corrupt orthography. Dr. Sims, in *Curt. Mag.*, has used *chinensis*, but this is liable to objection, as the name of a country to which the plant is not quite peculiar; and Loureiro's *cantonensis* is therefore still more exceptionable. This last author concurs in the opinion that all the common Chinese teas belong to one species. He describes indeed two others, *T. cochinchinensis*, which seems a trifling variety of the above; and *T. oleosa*, growing wild near Canton, said to bear a yellow berry, whose seeds supply the Chinese with lamp-oil.

THEA, in *Gardening*, furnishes plants of the exotic shrubby kind, the species of which chiefly in use is the tea-tree (*thea*).

This tree, as it is commonly described, differs in height, in its native climate, from five or six feet to thirty, and even one hundred and fifty, or more, when let grow to its full size and dimensions.

And in respect to the varieties of it, Martyn has considered them all as forming one species, in which he is, he asserts, supported by the best authorities. Kämpfer, he contends, attributes their difference to soil, culture, age of the leaves, and method of curing them. Mr. Ellis also directly asserts, that the green and bohea tea are one and the same species; and that it is the nature of the soil, the culture, and manner of gathering and drying the leaves, that make the difference. So also Sir George Staunton maintains, that every information received concerning the tea plant concurred in affirming, that its qualities depended upon the soil in which it grew, and the age at which the leaves were plucked off the tree, as well as upon the management of them afterwards. See TEA and THEA.

The bohea tea-trees now introduced into many botanic gardens near London, exhibit very obvious varieties: the leaves are of a deeper green colour, and not so deeply serrated; and the stalk is usually of a darker colour: but the botanical characters are the same. Thunberg also distinguishes two varieties from the leaves, which in one are smaller, flat, darker green, with straight serratures, and in the other larger, waved, brighter green, with sinuate serratures: but they can scarcely be considered as distinct species. Loureiro observed little difference in the sou-chong which he examined: both these have a brown colour, but are more odorous and precious than the common bohea of the province Fo-kien, which he had not an opportunity of seeing in a living state, though it is the most common and cheapest of all. He examined the dry flowers of the green-tea from the province of Kiang-si, and observed the same inconstancy as to the number of parts in the calyx and corolla, as in the bohea. Upon the whole, he concludes that all the differences of Chinese tea form only one botanical species, owing their variation to soil, culture, and method of preparation; all retaining the same inconstancy in the parts of the flower, which gave occasion to Linnæus to consider them as two species. Besides, it is evident that many varieties of tea are known in China, which arise from mixture and management.

The distinctions chiefly regarded in Europe are the following.

*Green Teas*.—1. Bing, imperial or bloom tea, with a large loose leaf, of a light green colour, and a faint delicate smell.

2. Hy-tiann, hikiong, hayssuen or heechun, known to us by the name of hyson tea: the leaves are closely curled

and small, of a green colour verging towards blue. Another hyson tea, with narrow short leaves, is called hyson-utchin. There is also a green tea named globe, with long narrow leaves.

3. Song-lo or singlo, which name it receives, like several others, from the place where it is cultivated.

*Bohea Teas*.—1. Soo-chuen, fut-chong, sou-chong, or fu-chong, called by the Chinese faa-tyang, and fact-chaon or fy-tyann, is a superior kind of cong-fou tea. It imparts a yellowish-green colour by infusion, and has its name from a place or province in China. Padre futchong has a finer taste and smell: the leaves are large and yellowish, not rolled up, and packed in papers of half a pound each. It is generally conveyed by caravans into Russia: without much care it will be injured at sea. It is rarely to be met with in England.

2. Cam-ho or foun-lo, called after the name of the place where it is gathered: a fragrant tea with a violet smell; its infusion is pale.

3. Cong-fon, congo, or bong-fo: this has a larger leaf than the following, and the infusion is a little deeper coloured. It resembles the common bohea in the colour of the leaf.

There is also a sort called lin-kifam, with narrow rough leaves. It is seldom used alone, but mixed with other kinds. By adding it to congo, the Chinese sometimes make a kind of pekoe tea.

4. Pekao, pekko, or pekoe, by the Chinese called back-ho or pack-ho: it is known by having the appearance of small white flowers intermixed with it.

5. Common bohea or black tea, called moji or mo-ee by the Chinese, consists of leaves of one colour. The best is named Tao-kyonn. An inferior kind is called An-kai, from a place of that name. In the district of Honam, near Canton, the tea is very coarse, the leaves yellow or brownish, and the taste the least agreeable of any. By the Chinese it is named honam-te, or kuli-te.

But besides these, tea, both bohea and green, is sometimes imported in balls, from two ounces to the size of a nutmeg and of peas. The Chinese call it poncul-tcha. The smallest in this form is well known under the name of gunpowder tea.

And sometimes the succulent leaves are twisted like pack-thread, an inch and a half, or two inches long; three of these are usually tied together at the ends by different coloured silk threads. Both green and bohea teas are prepared in this manner.

The manner of gathering and preparing the leaves, as practised in Japan, according to Kämpfer, as far as our information reaches, is in a great measure conformable to the method used by the Chinese. See TEA.

Whether the Chinese collect the tea precisely at the same seasons as in Japan, we are not well informed; but most probably the tea harvest is nearly at the same periods, the natives having frequent intercourse, and their commercial concerns with each other being very extensive.

For an account of the preparation of the tea-leaves, &c. see TEA.

The country people cure their tea-leaves in earthen kettles, which answer every necessary purpose, at less trouble and expence than by the process described under the article TEA, and they are thus enabled to sell them cheaper. After the tea has been kept for some months, it is taken out of the vessels in which it was stored, and dried again over a very gentle fire, that it may be deprived of any humidity which remained, or it might have since contracted.

The common tea is kept in earthen pots with narrow mouths; but the best sorts, used by the emperor and nobility, is put into porcelain or china vessels. The coarsest tea is kept by the country people in straw baskets, made in the shape of barrels, which they place under the roofs of their houses, near the hole that lets out the smoke.

*Method of Culture.*—These plants may be raised in this country by seeds, layers, and cuttings of the young branches. The editor of Miller's Dictionary advises that the seeds should be procured from China, and that care should be taken that they be fresh, sound, ripe, white, plump, and moist internally. After being well dried in the sun, they may be inclosed in bees-wax, or, left in their capsules, they may be put into very close canisters of tin or tutenague. Thouin, in his directions to Perouse, it is said, recommends these and other seeds to be placed in alternate layers of earth or sand, in tin boxes, closed up exactly, and placed in solid cases, covered with waxed cloth; the boxes to be placed in a part of the ship the least accessible to moisture, and the most sheltered from extreme heat or cold. And Mr. Sneyd, it is added, was very successful in having seeds packed up in absorbent paper, and surrounded by raisins or moist sugar, which kept them in a state fit for vegetation. American seeds are frequently brought over, by putting them into a box, not made too close, upon alternate layers of moss, in such a manner as to admit the seeds to vegetate. This might be tried with the seeds of the tea-tree; and to succeed more certainly, some of the seeds might be sown in pots or boxes, when the vessel arrives at St. Helena, and after passing the tropic of Cancer, near the latitude of thirty degrees north. But the best method seems to be, to sow ripe seeds in good light earth in boxes, at leaving Canton, covering them with wire, to prevent rats and other vermin from getting to them; and taking care that the boxes be not exposed to too much air, nor to the spray of the sea. A little fresh or rain-water should be sprinkled over them now and then; and when the seedling plants appear, they should be kept moist and out of the burning sun. If young plants can be procured in China, they may be sent over in a growing state in boxes, forty inches long by twenty broad, and as much in depth, having a few holes bored through the bottom. When the trees arrive here, they must be kept in a greenhouse during the winter, and in the open air during the summer; and if they come in bad condition, it may not be amiss to plunge the pots into which they are transplanted in a gentle hot-bed, or to set them in a tan-pit, to make them strike and shoot more freely. It is further remarked, that though the tea-tree will not at present bear the rigour of our winters in the open air, yet it is not impossible but it may gradually become naturalized to our climate, like the magnolia, among several other trees and shrubs; especially if it were to be brought from the coldest provinces of China, where it grows, or from the parts of Europe a little to the southward of us, when it has been naturalized there. It is increased freely from cuttings, when managed in the same manner as gardenias: and it also sometimes grows from layers laid down in the autumn or spring.

Some of these plants should be always kept in pots, to be removed under the shelter either of a greenhouse, glass case, or deep garden frame, in winter; and others be planted in a dry, well-sheltered, warm, conspicuous part of the shrubbery, to be afforded occasional covering from rigorous frosts.

They afford variety in greenhouse collections, as well as in the shrubberies.

Although in this country, plants of this kind are only cultivated for the purpose of curiosity, variety, and diversity among greenhouse and other collections, in small quantities; in China, where they are natives, they are raised in vast abundance in plantations of very great extent for their leaves, which form a great and valuable article of merchandize to that country for the supply of England and most other parts of Europe, they being employed, in their different prepared states, for the making of an infusion with boiling water, which is called tea, and which is very generally in use, especially in this and some other countries. For other particulars, see TEA.

THEAK, in *Rural Economy*, a word provincially used to signify thatch.

THEAKIKI, in *Geography*, a river of North America, which runs into lake Illinois, N. lat. 40° 52'. W. long. 89° 15'.

THEAME, in *Ancient Geography*, a town of Asia, in Babylonia, on the confines of Arabia Deserta. Ptol.

THEANDRIC, Θεανδρικός, *dei-virile*; a term signifying divine and human, formed from Θεός, *God*, and ανθρωπος, *man*.

St. Dionysius, bishop of Athens, first used the word *theandric*, to express a double operation, or two operations united in Jesus Christ; the one divine, the other human. The Monophysites afterwards abused it, to signify the one only operation which they admitted in Jesus Christ; in whom they believed there was a mixture of the divine and human nature, whence resulted a third nature, which was a compound of the one and the other, whose operations followed the essence and qualities of the mixture, and were neither divine nor human, both at once, or, in one word, *theandric*.

Θεανδρική ενεργεια, *theandric*, or *dei-virile* operation, in the sense of Dionysius and Damascenus, is thus exemplified by Athanasius. When Christ healed the person who was born blind, the spittle he voided was human, but the opening of the eyes was done by his divine power. And thus, in raising Lazarus, he called as man, but awaked him from the dead as God.

The term *theandric*, and the dogma of *theandric* operations, were examined with great care and attention, at the council of Lateran, held in 649, where pope Martin solidly refuted the notion of *theandric* operations, and shewed, that the sense in which St. Dionysius first used the word was Catholic, and quite remote from that of the Monophysites and Monothelites.

THEANGELA, in *Ancient Geography*, a town of Asia Minor, in Caria.

THEANO, or TEANO, in *Geography*, a town of Italy, in the kingdom of Naples, and province of Lavora; the see of a bishop, suffragan of Capua; 15 miles N. of Capua.

THEANTHROPOS, Θεανθρωπος, formed from Θεός, *God*, and ανθρωπος, *man*, denominated *God-man*; a term sometimes used in the schools to signify Jesus Christ, who was regarded as God-man; or represented by some scholastic theological writers, as comprehending two natures in one person.

THEANUM, in *Ancient Geography*, a town of Italy, in Campania, upon the Latin way, S.E. of Casinum. See THEANO.—Also, a river of Italy.

THEATER, or THEATRE, *Theatrum*, formed from θεατρον, *spectacle*, of θεαομαι, *I see*, among the *Ancients*, a public edifice, for the exhibition of scenic spectacles or shows to the people.

Under the word *theater* was comprehended, not only the eminence on which the actors appeared, and the action passed,

passed, but also the whole area or extent of the place, common to the actors and spectators.

In this sense, the theater was a building encompassed with porticoes, and furnished with seats of stone, disposed in semicircles, ascending gradually over one another; which encompassed a space called the *orchestra*, in the front of which was the proscenium, or pulpitum, on which the actors performed, and which is what we distinctly call the theater, or stage. The proscenium was divided into two parts; the one higher, on which the actors declaimed, and the other lower, on which the chorus was commonly placed. This latter was raised ten or twelve feet above the pit, from which there was an ascent to it; and thus situated, the chorus might easily turn either towards the actors or towards the spectators.

On the proscenium stood the *scena*, a large front, adorned with orders of architecture, behind which was the post-scenium, or places where the actors made themselves ready, retired, &c. So that the *scena*, in its full extent, comprehended all the part belonging to the actors. In the first ages of the Roman commonwealth, theaters were only temporary, and formed of wood: the most celebrated of these was that of M. Scæurus, mentioned by Pliny. The first fixed theater was erected by Pompey the Great, who built it very magnificently with square stone.

In the Greek theaters, the orchestra made a part of the *scena*, but in the Roman theaters, none of the actors ever descended into the orchestra; which was taken up by the seats of the senators.

The most celebrated theaters remaining of antiquity, are the theater of Marcellus, and that of Pompey; which are also called *amphitheaters*.

At Athens are still seen the remains of the temple of Bacchus, which was the first theater in the world, and was a master-piece in architecture. All theaters were consecrated to Venus and Bacchus.

THEATER, among the *Moderns*, more peculiarly denotes the stage, or place on which the drama, or play, is exhibited; answering to the proscenium of the ancients.

In its full latitude, however, the theater includes the whole play-house: in which sense it is a spacious room, or hall, part of which is taken up by the *scena*, which comprehends the stage, the decorations, and the machines; and the rest is distributed into a space, called the *pit*, or *parterre*, which is covered with seats, boxes, &c. and terminated with an elevation of one or two galleries, disposed into benches ascending over one another. See *DRAMATIC Scenery*, *PLAY-HOUSE*, and *SCENOGRAPHY*.

THEATER is also used in *Architecture*, chiefly among the Italians, for an assemblage of several buildings, which, by a happy disposition and elevation, represents an agreeable scene to the eye.

Such are most of the vineyards at Rome; but particularly that of Monte Dragone, at Fiescati; and in France, the new castle of St. Germain en Laye.

THEATER, *Anatomical*, in a school of *Medicine* and *Surgery*, is a hall, with several rows of seats, disposed in the circumference of an amphitheater, having a table, bearing on a pivot, in the middle, for the dissection of bodies.

Such is the anatomical theater of the royal garden at Paris.

The *Theater* at Oxford is a beautiful building, erected by archbishop Sheldon, for the use of scholastic exercises. See *OXFORD*.

THEATINES, an order of nuns, under the direction of the Theatines.

There are two kinds of Theatines, under the title of  
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“Sisters of the Immaculate Conception,” who form two different congregations, the one engaged by solemn vows, and the other only by simple vows. Their common foundress was Ursula Benincasa. Those who make the simple vows are the most ancient, and are called absolutely “Theatines of the Congregation:” they had their rise at Naples in 1583.

The others are called “Theatines of the Hermitage:” the whole business of these is praying in retirement, and an austere solitude, to which they engage themselves by solemn vows.

The Theatines of the first congregation take care of the temporal concerns of these last. Their houses stand together, and communicate by a large hall. Their foundresses drew up their constitutions, and laid the foundation of their house at Naples; but died before it was finished.

Gregory XV. who confirmed the new institute under the rule of St. Augustine, appointed that they should be under the direction of the Theatines. Urban VIII. revoked this article by a brief in 1624, and subjected them to the nuncio of Naples: but Clement IX. annulled this brief, and submitted them anew to the Theatines by a brief in 1668.

THEATINS, a religious order of regular priests: thus called from their first superior Don John Pietro Caraffa, archbishop of Chieti, in the kingdom of Naples, which was anciently called *Theate*.

The same archbishop became afterwards pope, by the name of Paul IV. after having been a companion of Gaetan, or Cajetan, a Venetian gentleman, the first founder of this order, at Rome, in 1524.

The Theatins were the first who assumed the title of *regular clerks*. They have not only no lands, or fixed revenues, either in common, or in propriety; but they do not even ask or beg any thing; but wait for what Providence shall send them for their subsistence.

They employ themselves much in foreign missions; and in 1627, they entered upon Mingrelia, where they have an establishment: they have had the like in Tartary, Circassia, and Georgia; but this they have since abandoned.

Their first congregation appeared at Rome in 1524, and was confirmed in the same year by Clement VII. Their constitutions were drawn up at a general chapter in 1604, and approved by Clement VIII. They wear the priest's habit.

THEATRE. See THEATER and AMPHITHEATER.

THEATRIC BANDAGES, a term used by Hippocrates, to express the parade of surgery in applying bandages for show, when there was no real use in them. All such bandages he called *theatric*, only proper to be looked at.

THEAUA, in *Ancient Geography*, a town of Spain, in the interior of the Tarragonensis.

THEAVE, a term applied in some districts to an ewe of the first year. It is sometimes written *thave*, and also *thief* in different districts.

THEBE, or THEBES, in *Ancient Geography*, a considerable, and in some respects the principal, town of Bœotia, situated towards the middle of the country, near the river Ismenê, S.E. of the lake Copais. This town owed its origin to Cadmus; but being considerably augmented, the part of the town which was seated upon an eminence, and which was called Cadmæa from the name of its founder, was regarded as a citadel in reference to the lower town. Here was a spring, which conveyed water to the city by subterraneous channels. Amphion and Zethus, having taken possession of the country, joined the upper and lower towns, and called the place Thebes. According to Homer it had seven gates, the intervals being occupied by walls. It is

said to have been 43 stadia (1 league 1563 toises) in circumference. Its environs are embellished by two rivers, by meadows and gardens. Myron of Byzantium says, that Amphion was the first person who erected an altar to Mercury, and that the god recompensed his zeal by giving him a lyre. The Thebans carried on various wars with the Plataeans for ascertaining their respective limits; and against the Athenians at Plataea for having sought the friendship of the king of Persia against the common interest of the Greeks. In process of time, the Thebans avenged themselves by defeating the Athenians at Delium, near the Tanagra. The Macedonians, after the battle of Cheronæa, placed a garrison at Thebes, where it remained till after the death of Philip. Alexander having taken the city, and expelled its inhabitants, who retired to Athens, Cassander, the son of Antipater, re-established them there, with the assistance of the Athenians, the Messenians, and the Megalopolitans. Sylla at length reduced them to extreme misery, for having declared in favour of Mithridates.

In the time of Pausanias, the whole lower part of the town was in ruins, except the temples, and the citadel only was inhabited and denominated Thebes. The temple of Apollo was seated on an eminence near one of the gates, and the river Ismené, which passed by it, gave to the god and the hill on which his temple stood the name of Imenius. Mercury and Minerva had each a statue of marble at the entrance of the vestibule of this temple: that of Mercury was the work of Phidias, and that of Minerva was executed by Scopas. The statue of Apollo in the temple was wrought of cedar-wood. In this temple were also brazen tripods of excellent workmanship. Hercules Promachus had a temple near another of the gates of the city, in which was his statue of marble; a colossal figure by Alcamenes, and his labours by Praxiteles. The temple of Ammon had a statue executed by Calamis and dedicated by Pindar. Here was also the temple of Fortune, and the goddesses held Plutus in her arms under the form of an infant. The temple of Ceres Thesmophorus, or the legislator, had been anciently the house of Cadmus, in which was exhibited a bust of the statue of the goddesses. The theatre was near another gate, and near it a temple of Bacchus Lylius. The temple of Diana Euclea was in the same quarter; the statue of the goddesses was the work of Scopas. Jupiter, surnamed the *Highest*, had a temple near the gate of this appellation. Here were a place of exercise and a stadium; and in the midst of the stadium was the tomb of Pindar. The river Iree passed near Thebes, and beyond it were the ruins of the house of Pindar, and a kind of chapel which this poet had built in honour of Cybele. Her statue was formed of Pentelic marble. Entrance into the chapel was allowed only one day in the year. The temple of Themis was near one of the gates of Thebes, and her statue was of white marble. Jupiter Agoreus and the Paræa had also their temples. The statue of Hercules Rhinocollutes was in full view in this part of the city. The sacred wood of Ceres Cabiria and of Proserpine lay at about 25 stadia from Thebes. The temple of the Cabiri was at the distance of seven stadia. According to Pausanias, there was seen at Thebes a statue of Venus Urania, which was said to have been formed of parts of the ships that brought Cadmus into Greece. It was the most ancient statue in Greece. The population of this city was very considerable. When it was taken by Alexander, more than 6000 persons perished, and more than 30,000 were sold for slaves. Some priests were spared and many citizens fled. Hence we may presume, that the number of inhabitants in Thebes and its district might amount to 50,000 of all ages and sexes, without in-

cluding slaves. The inhabitants, like those of Athens, were divided into three classes; the first composed of citizens, the second of naturalized foreigners, and the third of slaves. The Thebans were deemed to be courageous, insolent, and vain; and murders were frequently the consequence of the most frivolous quarrels. The women were both well made and generally of a fair complexion, of a noble carriage, and not inelegant dress; their voice was remarkably sweet and tender; and that of the men harsh and disagreeable, and in some measure suited to their character. The "sacred battalion" of Thebes is famous in history. It consisted of a body of young warriors, brought up together, and maintained at the public expence, in the citadel. Their exercises, and even their amusements, were regulated by the melodious sounds of the flute; and in order to prevent their courage from degenerating into blind fury, care was taken to inspire them with the noblest and most animated sentiments. Each warrior chose from the band a friend, to whom he remained inseparably united. These 300 warriors were anciently distributed in troops at the head of the different divisions of the army Pelopidas, who had frequently the honour of commanding them, having made them fight in a body, the Thebans were indebted to them for almost all the advantages they gained over the Lacedæmonians. Philip destroyed this hitherto invincible cohort at Cheronæa; and the prince, seeing those young Thebans stretched on the field of battle, covered with honourable wounds, and lying side by side on the ground on which they had been stationed, could not restrain his tears, but bore a noble testimony to their virtue as well as their valour. Travels of Anacharsis, vol. iii. See THIVA.

THEBÆ, a town of Upper Egypt, on the right bank of the Nile. According to the ideas given us of this town by Homer, it was the most celebrated of antiquity. Ancient authors have given very different accounts of its extent. In the time of Strabo, this city had been destroyed. It had been ravaged by Cambyfes; it was afterwards despoiled of its riches by Ptolemy Philometer; and under the reign of Augustus, it was severely treated by Gallus on account of its rebellion. From this time it fell into a state of decline, from which it has not recovered. Tacitus mentions it as a town in ruins; and Juvenal speaks thus of it: This city extended on both sides of the Nile, although it was more particularly situated on the right bank of this river: a considerable portion of it lay to the left, which, according to Strabo, bore the name of "Memmonium." For a further account of this city, see THEBES.

THEBÆ was a name given to many ancient towns. *Thebe* was a town of Asia, in Cilicia hypoplaciana, situated on a plain, at the foot of mount Placion.—Also, a town of Judea, in the half-tribe of Manasseh, on this side of Jordan.—Also, a town of Macedonia, in the Phthiotide, 100 stadia from the town of Alos, according to Strabo.—Also, a town of Asia Minor, in Ionia, in the vicinity of Miletus.—Also, a town of Greece, in Attica.—Also, a town of Asia, in Cataonia.—Also, a town of Asia, in Syria.—Also, a town of Palestine, in the tribe of Ephraim.—Also, a town of Arabia Felix, upon the coast of the Red sea, in the country of the Cinædocolpites. Ptolemy.

THEBAID, THEBAIS, a famous heroic poem of Statius, the subject of which is the civil war of Thebes between the two brothers Eteocles and Polynices; or Thebes taken by Thebes.

Statius was twelve years in composing his Thebaid, which consists of twelve books: he wrote under Domitian. He is censured by the best critics, as Bossu, &c. for a vicious multiplicity of fables and actions, for too much heat and

extravagance, and for going beyond the bounds of probability.

Several Greek poets had composed Thebais, or poems of this name, before him; the principal were Antagoras, Antiphanes of Colophon, Menelaus the Ægean; and an anonymous author mentioned by Pausanias, lib. ix.

Aristotle, praising Homer for the simplicity of his fable, opposes to him the ignorance of certain poets, who imagined that the unity of fable or action was abundantly provided for by the unity of the hero, and who composed Theiseids, Herculeids, &c. in each of which, they collected every thing that had ever happened to their principal person.

THEBAIS, or THEBAID, called also *Said*, in *Ancient Geography*, a name given to Upper Egypt, from its principal city Thebes. It is in scripture called Pathros. This is the most southern part of Egypt next to Æthiopia, and is almost as extensive as all the other parts of Egypt, including the country on both sides of the Nile down to the Heptanomis or Middle Egypt; its best city, according to the ancients, being Lycopolis, (see SIUT,) on the western, and Antæopolis on the eastern side of the river. These dimensions agree pretty exactly with the present extent of Al Said, the most northern city of which is Manselût. In this part of Egypt there were formerly several cities of great note; such as Lycopolis, on the scite of which is supposed to be the present Manselût; Hypsele, or Aboutig, about a mile W. of the Nile; Aphroditopolis; Ptolemais; Abydos, once the second city of the Thebaid, famous for the magnificent palace of Memnon, but in the time of Strabo only a village; Little Diospolis, probably the present *Hou* (which see); Tentyra, the inhabitants of which were famous for their enmity to the crocodile, the ruins of which are still to be seen at *Dendera* (which see); Latopolis, or *Ejneh* (which see); Great Apollinopolis, on the scite of which Etfu is now supposed to stand (see APOLLINIS URBS, and ETFU); and Elephantine, on an island of that name, where are the ruins of a small temple. On the east side of the Nile are Antæopolis, on the scite of which Siout is supposed to have been built; Paffalus, conjectured to be the present Gava-Kiebre, where is seen a very beautiful portico of a temple, with eighteen pillars, in three rows; Panopolis and Cheramis, supposed to be the same city, but distinguished by Herodotus; the scite of Panopolis is said to be that of the present Akraim, about a mile from the river; Chenoboseia; Cæne or Neapolis, perhaps the present Kene, a small town on an eminence, about a mile from the river Coptos or Kept, and called by Pliny the emporium of commodities brought from India and Arabia; Coptos, where Christians were formerly very numerous (see COPTOS); Apollinopolis (see APOLLINIS URBS, or *Apollinopolis Parva* or *Kous*); and *Thebes*; which see. To the south of Thebes, and on the same side of the river, were the following cities: *viz.* Chnumis or Cnuphis; Elethya or city of Lucina; Orebos, now Comombo, or the hill of Ombo, on which are seen the ruins of an ancient temple (see COMOMBO); Syene; Philæ, (see PHILOE,) an island deemed sacred from an opinion that Osiris was buried there. The Thebaid in the first ages of the church was rendered famous by the number of hermits who resorted thither.

THEBAIS, a river of Asia Minor, in Caria. Pliny says that it traversed the town of Trallis.

THEBAN HARP. See HARP.

THEBANUS OPHITES, in *Natural History*, a name given by some of the ancients to that species of the ophites, or serpentine marble, more commonly called *ophites niger*, the black serpentine.

THEBARMAI, in *Ancient Geography*, Ormed, a town

of Asia, S.W. of lake Spauta, and at some distance from it, lies between a mountain and a small river that falls into this lake. The worship of fire prevailed in this province, under a persuasion that the first pyreum was kindled by Zoroaster himself.

THEBES, the capital city of the Thebais, or Upper Egypt, which was deservedly reckoned one of the finest cities in the world. It was also called Diospolis, or the city of Jupiter, and was built, as some say, by Osiris, but according to others, by Busiris. Its length, in the time of Strabo, was eighty furlongs, or ten miles; but this was very inconsiderable, compared with its ancient extent, before it was ruined by Cambyfes, which, we are told, was no less than 420 stadia, or 52½ miles. Its wealth was so great, that, after it had been plundered by the Persians, what was found, on burning the remains of the pillage, amounted to above 300 talents of gold, and 2300 of silver. The 100 gates of Thebes are mentioned by Homer, and, after him, by many others; but some think that this was not the number of the gates, but of the temples; and that from them the city had the epithet Hecatompulos, expressing a definite for an indefinite number. Pomponius Mela, and others, by the 100 gates, understand for many palaces of princes, each of whom could, on any occasion, arm and send out 20,000 fighting men, and 200 chariots. A modern traveller could observe no signs or remains of walls round Thebes: and if it had none, we must conclude, that by 100 gates, were meant the gates of the temples, or rather the palaces of great men. In Strabo's time the city stood chiefly on the east side of the river. At Thebes there were anciently four remarkable temples; one of them is said, by Diodorus Siculus, to have been 1½ mile in circumference, and 45 cubits in height, with walls 24 feet thick.

The venerable ruins of this city, probably the most ancient in the world, says Mr. Browne (*Travels, &c.*), extend for about three leagues in length along the Nile. East and west they reach to the mountains, a breadth of about 2½ leagues. The river here is about 300 yards broad; the circumference of the ancient city must therefore have been about 27 miles. In sailing up the Nile, the first village that occurs within the precincts is Kourna, on the W., with few houses, as the people chiefly live in the caverns. Next is Abubedjodj, a village, and Karnac, a small district, both on the E. The largest portion of the city stood on the eastern side of the river. On the S.W. Medinet-Abu marks the extremity of the ruins; for Arment, which is about two leagues to the S., cannot be considered as a part. Modern authors have styled the scite of Thebes, "*Luxor*" (which see); and others have denominated it "*Akfor*;" both which terms are, in Mr. Browne's opinion, corruptions of "*El Kassar*," the appellation still applied to the ruins by the Arabs. The most considerable ruins are those on the E. of the Nile. The chief of these is the "*great temple*," an oblong square building of vast extent, with a double colonnade, one at each extremity. The massy columns and walls are covered with hieroglyphics. The "*great temple*" stands in the district called Karnac. Next to this in importance is the temple at Abu-Hedjadj, and here are numerous ruins, avenues marked with sphinxes, &c. On the W. side of the Nile appear two colossal figures, apparently of a man and woman, formed of a calcareous stone like the rest of the ruins:—remains of a large temple, with caverns excavated in the rock:—the magnificent edifice styled the "*palace of Memnon*," some of the columns being about 40 feet high, and about 9½ in diameter: the columns and walls are covered with hieroglyphics: this stands at Kourna: Behind the palace is the passage denominated

“Bibân-el-Molük,” leading up the mountain; at the extremity of which passage, in the sides of the rock, are the celebrated caverns known as the sepulchres of the ancient kings. These sepulchres, which have lately been discovered, are particularly described by Mr. Browne. In the cells or recesses of the passage of the largest of these, appear the chief paintings, representing the mysteries, which, as well as the hieroglyphics covering all the walls, are very fresh. Our traveller particularly observed the two harpers described by Bruce, but his engraved figures, he suggests, seem to be from memory. Although Pococke and many others are of opinion that Thebes was never surrounded by a wall, Mr. Browne inclines to a contrary opinion, from some faint remains which are still visible.

We are principally indebted to Denon (*Travels in Upper and Lower Egypt*, in 3 vols. 8vo. translated by Aikin), for an interesting account of the magnificent ruins of Thebes, as well as of other places in Egypt, illustrated by beautiful engravings. Four large hamlets (says Denon) divide amongst them the remains of the ancient monuments of Thebes, whilst the river, by the sinuosity of its course, seems still proud of flowing among its ruins. In crossing the ground occupied by the ancient Thebes, Denon found nothing but temples; not a vestige of the 100 gates so celebrated in history; no walls, quays, bridges, baths, or theatres; not a single edifice of public utility or convenience. Temples indeed were numerous, and walls covered with obscure emblems and hieroglyphics, which attested the ascendancy of the priesthood, who still seemed to reign over these mighty ruins. The space occupied by this incomprehensible town now enfolds four villages and as many hamlets, thinly scattered over immense fields. Passing through the territory of Thebes on another occasion, Denon saw at the distance of three-fourths of a league from the Nile, the ruins of a large temple not before noticed by any traveller, which may give an idea of the immensity of that city, since, if we suppose that it was the last edifice on the eastern side, it is more than  $2\frac{1}{2}$  leagues distant from Medinet-Abu, where the most western temple is situated. The temple, on the site of which the village of Karnac has been built, is of such a circumference, that it would require half an hour to walk round it. Herodotus has given us a more correct idea of its grandeur and magnificence. Diodorus and Strabo, who examined it in its ruinous state, appear to have furnished a description of its present condition, but none of the travellers who have copied the accounts of these writers have presumed (says Denon) to prefer to this temple that of Apollinopolis at Etfu, that of Tentyra, and the simple portico at Esneh. It is probable (says this writer) that the temples of Karnac and Luxor were built in the time of Sesostris, when the flourishing condition of the Egyptians gave birth to the arts among them, and when these arts were displayed to the world for the first time. Of the 100 columns of the portico of the temple of Karnac or *Carnac* (which see), the smallest are  $7\frac{1}{2}$  feet in diameter, and the largest 12. The space occupied by its circumvallation contains lakes and mountains. This edifice is now in a degraded state. The sphinxes have been wantonly mutilated; and the avenue that leads from Karnac to Luxor, nearly half a league in extent, contains a succession of chimerical figures to the right and left, with fragments of stone walls, of small columns, and of statues.

*Luxor* (which see), the finest village in these environs, is also built on the site of the ruins of a temple, not so large as that of Karnac, but in a better state of preservation, the masses not having as yet fallen through time, and by the pressure of their own weight. The most colossal parts con-

sist of fourteen columns of nearly eleven feet in diameter, and of two statues in granite, at the outer gate, buried up to the middle of the arms, and having in front of them the two largest and best preserved obelisks known.

A peculiarity belonging to the temple of Luxor, is, that a quay, provided with an epaulement, secured the eastern part, which was near the river, from the damages the inundations might otherwise have occasioned. The epaulement, which since its original structure has been repaired and augmented in brick-work, proves that the river has not changed its bed; and its preservation is an evidence that the Nile has never been banked by other quays, since no traces of similar constructions are elsewhere to be met with.

Nothing can be more grand, and at the same time more simple, than the small number of objects of which this entrance is composed. No city whatever makes so proud a display at its approach as this wretched village, the population of which consists of two or three thousand souls, who have taken up their abodes on the roofs and beneath the galleries of this temple, which has, nevertheless, the air of being in a manner uninhabited.

Denon has particularly described the tombs above-mentioned, in the village of Kurnu, the ancient Necropolis of Thebes; and he concludes with remarking, that the mystery and magnificence observable within these excavations, and the number of slaves by which they are protected, indicate, that the religious worship which had scooped out and decorated these grottoes, was the same as that which had raised the pyramids; but our limits forbid a farther detail.

THEBET, in *Chronology*. See *TEBET*.

THEBIT BEN CORAH, or THABET BEN KORRA, in *Biography*, an Arabian teacher of philosophy and mathematics, was a native of Harran, and belonged to the sect of the Sabæans, and on this account was surnamed “Al-Sabi-Al-Harrani.” The time in which he flourished is uncertain. Some say that he was born in the 221st year of the Hegira, or A.D. 835; others refer him to the 10th century; and others again have placed him in the 12th or 13th century. He was secretary to the caliph Mothaded; and was distinguished by his skill in the mathematics, and by his knowledge of astronomy. He is said to have observed the declination of the ecliptic, which he fixed at  $23^{\circ} 33' 30''$ : and from this circumstance it has been concluded, that he lived in the 12th or 13th century, or that he was contemporary with Almeon and Prosalus, who about that period assigned to the ecliptic the same declination. To Thebit has been ascribed the origin of the astronomical sect, which maintained the trepidation of the fixed stars. It was his opinion, founded on some erroneous observations, that the fixed stars moved for some time according to the order of the signs; that they afterwards proceeded in a retrograde direction and returned to their former places, after which they assumed a direct motion; and that then they had an irregular motion, which was rapid for a certain period, then became slower, and at last insensible. According to Thebit, the obliquity of the ecliptic was variable, and subject to similar periods of increase and decrease. His opinions prevailed for a considerable time, not only among the astronomers of his own nation, but among some Christians. Montucla *Hist. de Math.* Pococke, p. 377. Fabr. *Bib. Græc.* v. ii. p. 354.

THECA, SHEATH, in *Anatomy*, hollow organs, serving to contain others. The theca of the fingers are strong sheaths binding down the flexor tendons. The theca vertebralis is the sheath of dura mater lining the vertebral canal, and containing the medulla spinalis.

THECA,

**THECA**, in *Botany*, the Latin word for a *cell*, *sheath*, or *case*, is used occasionally by some botanists in their descriptions of seed-vessels; and especially by Acharius, for those minute vertical parallel cells, in the disk of the shields or tubercles of a *Lichen*, in which its seeds are lodged. See **LICHENES** and **PEZIZA**.

**THECHES**, in *Ancient Geography*, a mountain of Asia, in Armenia, according to Xenophon, who says that the Greeks, after leaving Gymnias, arrived on the fifth day at the sacred mountain called Theches, and from thence they for the first time perceived the Euxine sea, which occasioned loud exclamations of joy.

**THECUA**, a town of Palestine, in the tribe of Juda; situated 12 miles S. of Jerusalem, according to Eusebius and Jerome. Josephus says that it was in the vicinity of Herodium. See **TEKOÄ**.

**THEDINGHAUSEN**, in *Geography*, a town of Germany, in the county of Hoya; 12 miles N.N.W. of Hoya.

**THEDO**, in *Ichthyology*, a name given by Figulus and others to the trout.

**THEFT**, **FURTUM**, in *Law*, an unlawful, felonious taking away another man's moveable and personal goods, against the owner's will, with an intent to steal them. See **LARCENY**.

Open theft from the person, or in the presence of the owner, is properly called *robbery*; which see.

**THEFTBOTE**, the receiving of a man's goods again from a thief, or other amends, by way of composition, and to prevent prosecution, that the felon may escape unpunished; the punishment of which is now fine and imprisonment.

This is frequently called *compounding of felony*. By 25 Geo. II. c. 36. even to advertise a reward for the return of things stolen, with no questions asked, or words to the same import, subjects the advertiser and the printer to a forfeiture of 5*l.* each.

**THEIFENEGE**, in *Geography*, a town of Carinthia; 3 miles N.E. of Wolfsberg.

**THEIMSDORF**, a town of Lusatia; 6 miles E. of Rothenburg.

**THEINRED**, in *Biography*, precentor of the monastery of Dover, and author of a treatise on music, in Latin, preserved among the MSS. of the Bodleian Library, in three books, written about the year 1371.

The first book treats of musical proportion; "De Proportionibus Musicorum Sonorum." This is a very early treatise upon harmonics, in which, when he speaks of the major and minor semitone, and of the different portions into which they are divisible, his doctrine is illustrated by many numerical tables, and nice splittings of tones into commas; "De Comatis; alia Proportio ejusdem Comatis, &c." which prove a *temperament* of the scale to have been then in use.

The second book treats of musical concords; "De Consonantiis Musicorum Sonorum." Here, after specifying the different kinds of concords, he informs his reader, that in *organising*, major and minor thirds, as well as sixths, are admissible in succession.

The third book contains diagrams and scales innumerable of different species of octave, in a literal notation. No musical characters, or examples of practical music in common notes, appear throughout the treatise.

The praises bestowed by Pits, Bale, Tanner, and others on Theinred, whose name is sometimes written Thaurad, and Thinred, make it necessary to acquaint such of our readers as may be inclined to take the trouble of examining this

tract themselves, that, like many other musical writings of the middle and lower ages, it but ill rewards the drudgery of an entire and careful perusal; for after perseverance has vanquished the abbreviations, and the barbarism and obscurity of the Latin, the vain speculations and useless divisions of the scale, with which this work so much abounds, and which could have been but of small utility to practical music, at the time when it was written, are such, that now, since the theory of sound is so much better understood and explained by the writings of Galileo, Merfennus, Holder, Smith, and many others; our old countryman, Theinred, may henceforth remain peaceably on his shelf, without much loss to the art or science of music. Bodl. 842. 1. De legitimis ordinibus Pentachordorum et Tetrachordorum, Pr. Quoniam Musicorum de his Cantibus frequens est distinctio, &c. 46 folios, small size. Walther in his Lexicon calls this work a Phœnix.

**THEIOCRUS**, in the *Materia Medica of the Ancients*, a name given by some to the melantheria.

The name *theiocrus* signifies only sulphur-coloured, and was at first used with the name of vitriol, as expressive of the difference of this kind from others; but in time it became common to use it alone.

**THEISM**. See **DEISM**.

**THEISOA**, or **THISOA**, in *Ancient Geography*, a town of the Peloponnesus, in Arcadia.

**THEIUM**, a town of Greece, in Athamania.

**THEIUS**, a river of the Peloponnesus, in Arcadia, which discharged itself into the Alphæus.

**THEKA**, in *Botany*, the Malabar name of the Teak tree, retained as generic by Jussieu. See **TECTONA**.

**THEKUPHÆ**. See **TEKUPHÆ**.

**THELA**, in *Botany*, so named by Loureiro, Cochinch. 119, from *θηλα*, a *nipple*, in allusion to the little glandular prominences which cover the calyx, appears, by his description, to be the same genus with the Linnaean **PLUMBAGO**. See that article.

**THELARY**, in *Geography*, a town of Hindoostan, in Bahar; 18 miles S.W. of Bahar.

**THELBALANA**, in *Ancient Geography*, a town of Asia, in the Greater Armenia. Ptol.

**THELBENCANA**, a town of Asia, in Babylonia, on an arm of the Euphrates.

**THELDA**, a town of Asia, in Mesopotamia, on the banks of the Euphrates. Ptol.

**THELE**, a word used by some to express the nipple, and by others for the whole breast.

**THELEBOÆ**, in *Ancient Geography*, a people of Epirus, in Acarnania, who passed into Italy, and established themselves in the island of Caprea.

**THELEBOLUS**, in *Botany*, from *θηλα*, a *nipple*, and *βολος*, a *case*, or *throw*, because the little vesicle, lodging the seeds, resembles a nipple, and is thrown off with a degree of elasticity. The name was originally written *Thelebolus*, but the above is justly preferred.—Tode Mecklenb. v. 1. 41. Pers. Syn. 116.—Class and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi angiocarpi*.

Ess. Ch. Receptacle cup-like, somewhat globose, entire at the edge, discharging a papillary, nearly naked, seed-vessel.

1. Th. *sercoreus*. Small Nipple-fungus. Pers. n. 1. Tode n. 1. t. 7. f. 56.—Found by Tode on the dung of swine, after rainy weather in June and July. He compares it to the roe of fish in appearance, and to poppy-seed nearly in size. The colour is a tawny yellow. Each individual is globular, attached at the bottom by capillary roots, and crowned with a small papillary tubercle, of a more

more orange or golden hue than the rest. This is at length thrown off, with a sudden and strong elastic force, leaving a minute, bordered, viscid pit, or cup, which gradually dilates into a level surface.

The minute fungus above described is closely related to *Sphaerobolus*, and still more nearly perhaps to *Pilobolus*. (See those articles.) Whether it might be allowable to comprehend them under one genus, may admit of much dispute. Even the many-cleft *receptacle*, or *involucrum* of *Sphaerobolus* can hardly be deemed a sufficient important difference to supersede this measure, and still less the elongated figure, or pellucid substance, of *Pilobolus*. Botanists who bestow their concentrated attention exclusively on particular tribes of plants, are prone to multiply distinctions; but they are not rashly to be corrected by those who have not looked so closely, nor, perhaps, so well.

THELEDA, in *Ancient Geography*, a town of Asia, in Syria, situated on a plain W. of Seriana, and E. of Capparæ.

THELEPHORA, in *Botany*, from *θήλα*, a nipple, and *φορα*, to bear, because of the generally papillary covering of the under surface.—Willd. Berol. 396. Perf. Syn. 565. Schrad. Spicil. 182. (Craterella; Perf. Obs. Mycol. v. 1. 39. Corticium; ib. 37.)—Class and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi gymnocarpi*.

Eff. Ch. Head coriaceous, dilated; minutely papillary, bristly, or smooth, beneath. An ample, and, in our opinion, rather vague genus of the fungus tribe, of which Perfoon reckons up forty-seven species, ranged under three sections, once considered by him as distinct genera. We shall, after our usual manner, select a few examples of each.

SECT. I. CRATERELLA. Head undivided, hollow or funnel-shaped above, with a shaggy disk. Two species.

Th. *pallida*. Pale Thelephora. Perf. n. 1. "Ic. et Descr. Fung. 3. t. 1. f. 3, sub *Craterella*."—"Aggregate, corky, pale. Head concave, shaggy with scales."—Rarely found on the ground in moist woods. The stalk is very short; villous at the base. Head rough beneath, with little bristles, visible under a magnifying glass. Perfoon.

Th. *caryophyllea*. Carnation Thelephora. Perf. n. 2. Albert. and Schwein. Nisk. 272. (Craterella *ambigua*; Perf. Obs. Mycol. v. 1. 39. t. 6. f. 8—10. *Helvella caryophyllea*; Schæff. Fung. v. 4. 115. t. 325. Dickf. Crypt. fasc. 1. 20. *Auricularia caryophyllea*; Bulliard. t. 278. 483. Sowerb. Fung. t. 213.)—Head funnel-shaped, thin, purplish-brown, fringed, variously jagged or crisped.—Found on the ground in fir woods. Mr. Woodward first met with this species in Britain, near Bungay, Suffolk. Continental botanists usually speak of it as rare, but Mr. Sowerby says it is "a very common parasite on the exposed fantastic roots of old firs, in autumn." The substance is tough and somewhat woody; the colour a chocolate-brown. The plants often grow in masses, attached by their upper side to flicks, old bark, &c., and are from one to three inches in diameter. Sometimes the shaggy edge is white. Perfoon in his Obs. Mycol. above quoted seems disposed to think the present fungus may vary so much as to become *Ramaria palmata* of Holmskiöld, Fung. Dan. v. 1. 106. t. 33; but surely the multiplied divisions and ramifications of the latter, as well as its smoothness and colour, preclude such an idea.

SECT. 2. STEREUM. Head halved, finally horizontal. Thirteen species.

Th. *terrestris*. Ground Thelephora. Perf. n. 3. Ehrh. Crypt. n. 179. (Th. *mesenteriformis*; Willd. Berol. 397,

t. 7. f. 15.)—Somewhat imbricated, dull brown. Head flattened, shaggy with fibres. On sandy ground. This seems to us a mere variety of the last, or rather its most usual form, as represented in Mr. Sowerby's t. 213. Yet Perfoon cites this plate, with doubt, under his fourth species, *Th. laciniata*. He seems to lay too much stress on the absence or presence of a stalk, and perhaps makes too many distinctions.

Th. *rubiginosa*. Rusty Thelephora. Perf. n. 6. (Th. *fragilis*; Ehrh. Crypt. n. 238. *Helvella rubiginosa*; Dickf. Crypt. fasc. 1. 20. *Auricularia ferruginea*; Bulliard. t. 378. Sowerb. Fung. t. 26.)—Imbricated, rigid, rusty-brown, smooth on both sides, with scattered, rather large, knobs.—Not uncommon on gate-posts or pales, generally placed so low as to be partly hid by the earth and neighbouring plants, as Mr. Sowerby remarks. It is very distinct from the foregoing, soft like velvet to the touch; the under side bearing scattered, roundish prominences, which, however, do not appear concerned in the fructification. The edge is usually pale. No part is hairy or shaggy. The diameter of each plant is about an inch.

Th. *ferruginea*. Snuff-coloured Thelephora. Perf. n. 9. Albert. and Schwein. Nisk. 273. (*Auricularia tabacina*; Sowerb. Fung. t. 25.)—Wavy, somewhat reflexed, bright brown. Head thin, nearly even, slightly downy; hairy underneath.—Frequent on stumps and rotten branches, in various situations. The plants are sessile, attached by the back, projecting over each other, of an elegant undulated figure; the colour of both sides a bright reddish-brown, especially the upper, elegantly contrasted with the light-yellow border.

Th. *hirsuta*. Common Hairy Thelephora. Perf. n. 11. Willd. Berol. 397. Albert. and Schwein. Nisk. 274. (Th. *pallida*; Ehrh. Crypt. n. 169. *Auricularia reflexa*; Bulliard. t. 274. Sowerb. Fung. t. 27.)—Aggregate, rounded, coriaceous, convex, somewhat zoned, yellowish; shaggy above; smooth and tawny beneath.—Frequent on rotten stumps, posts, pales, tubs, &c.; either growing solitary, and roundish, about an inch in diameter; or in continued, confluent, somewhat imbricated masses. The under side is yellow or tawny; the upper of a pale yellowish-brown, marked with different concentric shades, and rough with imbricated soft shaggy hairs. The whole is often tinged with black, as if smoked. It varies in size as well as colour, and often consists of an expanded orange-coloured surface, closely pressed by its back to the wood, previous to its acquiring any projection by which the upper side is exposed. In this state it might be referred to the next section. *Auricularia papyrina*, Bulliard t. 402, seems nearly akin to this.

SECT. 3. CORTICIUM. Plant laid entirely on its back, indeterminate in form, papillary, various in substance.—Thirty-two species, divided into subordinate sections, according to the colour, whether pale or dark red, yellowish, brown, grey, or white.—It is very necessary to trace the progress of the species of this division, in order to be certain they do not, at any period, acquire a distinct upper surface, so as to range under the preceding.

Th. *quercina*. Oak Thelephora. Perf. n. 16. Albert. and Schwein. Nisk. 276. (Th. *carnea*; Ehrh. Crypt. n. 269. (*Auricularia corticalis*; Bulliard t. 436. f. 1.)—Oblong, coriaceous, rugose, pale flesh-coloured; the margin somewhat involute, of a blackish-brown at the back.—Found running longitudinally along decayed branches of oak. Each plant is two or three inches in length, somewhat oval, of a light flesh-coloured hue, with a powdery or downy surface, which water will not moisten, and which is besprinkled with round depressed protuberances, obscurely  
repre.

representing the shields of a *Lichen*. The margin soon becomes elevated and inflexed, especially by drought or cold, and displays the blackish under side, which ought to be the upper.

*Th. cruenta*. Blood-red *Thelephora*. Perf. n. 24.—“Smooth, coriaceous, tuberculated, blood-red.”—An elegant species, found on the branches of trees, and communicated by Ludwig from Misnia. *Perfoon*.

*Th. sanguinea*. Gory *Thelephora*. Perf. n. 25. (*Tremella cruenta*; Engl. Bot. t. 1800.)—“Widely spreading on the ground, somewhat gelatinous, blood-coloured, smooth.”—“This singular species,” says *Perfoon*, “grows in the streets of towns, about the walls of houses, looking at a distance like blood poured on the ground. By drying it becomes paler. Is it not rather to be referred to the order of *Algae*?” In this last suggestion we readily concur. The whole is truly an expanded mass of minute, uniform, gelatinous, pellucid granulations, with nothing of a coriaceous or fungous texture, nor any other character of the present genus.

*Th. hydnoidea*. Awl-bearing *Thelephora*. Perf. n. 28. Albert. and Schwein. Nisk. 279. (*Corticium hydnoideum*; Perf. Obs. Mycol. v. 1. 15.)—Spreading, concealed, orange-yellow, bearing awl-shaped elongated prominences.—This spreads under the separated cuticle of decayed dry branches of beech, which it sometimes totally encircles, extending to the length of four or six inches. Its great peculiarity consists in the awl-shaped projections, thrown out from its surface, to the height of two or three lines, which either penetrate, or force off, the superjacent cuticle of the tree, and, except in their great irregularity of size and figure, resemble the prickles of a *Hydnum*.

*Th. umbrina*. Umber-brown *Thelephora*. Perf. n. 36. Albert. and Schwein. Nisk. 281.—Spreading on the ground, soft, of an umber brown; the margin whitish and rather downy.—Found on the ground, in a sandy soil, spreading to the extent of two or three inches, and not of a very thin substance. *Perfoon* speaks of it as very rare, but the observing authors of the *Fungi Niskienfes* find it not unfrequently, in August and the following months, in shady sandy places.

*Th. casia*. Grey Ground *Thelephora*. Perf. n. 40. (*Corticium casium*; Obs. Mycol. v. 1. 15. t. 3. f. 6.)—Orbicular, on the ground, nearly smooth, of a greyish ash-colour.—Not unfrequent in autumn, on the bare ground, from one and a half to three inches broad, with a white, fibrous, rounded, scalloped edge. The grey surface is besprinkled with minute powdery seeds, regularly disposed in spots, four together. *Perfoon*.

*Th. lactea*. Milk-white Fir *Thelephora*. Perf. n. 45.—“Nearly orbicular, of a livid white; somewhat fleshy in the middle; fibrous at the margin.”—Rarely found on the bark of the Spruce Fir. The surface is smooth. The colour becomes paler by drying. *Perfoon*.

Albertini and Schweiniz describe several more species of this genus, to which every thing of a membranous texture, and fungous aspect, seems to be referred by authors. Some such may possibly be imperfect vegetable productions, whose growth, when completed, might prove them of a different nature. When their smooth surface discharges powdery seeds, they are to be considered as perfect species of *Thelephora*.

**THELIGONUM.** See **THELYCONUM.**

**THELMENISSUS**, in *Ancient Geography*, a town of Asia, in Syria, on an immense plain on the E. of the Orontes, N. of Apamea, and S.W. of Chalcis.

**THELONIUUM, TELONIUM**, signifies toll.

Among the Romans, *telonium* denoted a custom-house, or place where the toll was collected.

**THELONIO**, *Breve effendi quieti de*, a writ lying for the citizens of a city, or burghesses of a town, that have a charter or prescription to free them from toll, against the officers of any town or market, who would constrain them to pay it, contrary to the said grant or prescription.

**THELONIO rationabili habendo pro dominis habentibus dominica regis ad firmam**, a writ lying for him that hath of the king's demesne in fee-farm to recover reasonable toll of the king's tenants there, if his demesne hath been accustomed to be tolled.

**THELOTREMA**, in *Botany*, from *θηλη*, a nipple, and *τερυμα*, an orifice, in allusion to the pierced protuberances of the crust; a genus of the order of *Lichenes*, instituted by Acharius, in his *Methodus*, 130. The original type of this genus is *Lichen pertusus* of Linnæus, which is reduced, by the writer of the present article, to **ENDOCARPON**, (see that article,) in *Prodr. Fl. Græc.* v. 2. 304. The rest of the supposed species may perhaps be in like manner disposed of, or referred to *Urcularia*.

**THELPUSA**, in *Ancient Geography*. See **THALPUSA**.

**THELSEA**. See **THALSEA**.

**THELYGONUM**, in *Botany*, a name of very whimsical derivation, concerning which Linnæus has fallen into an error, like professor Martyn and M. De Theis, who have both of them been less penetrating than usual in their enquiries. They all deduce it from *θηλυς*, female, and *γονυ*, a joint, or knee; and the last of them supposes the original plant, which was our **MERCURIALIS**, (see that article,) to have been called *θηλυγονου*, because its swelled joints resembled the knees of a woman. This we modestly presume to be a very unauthorized comparison; and Pliny, from whom the name is borrowed, leads us to a less injurious, if not a wiser, solution. His sapient pages assure us that *Arsenogonon* (*αρσηνογονον*, or *αρρηνογονον*) was taken to procure male children, its fruit resembling a part of the male organs; while *Thelygonon*, which, though otherwise the same, bore no such fruit, was supposed to cause the production of females. The word therefore is composed of *θηλυς*, and *γονος*, generation, or offspring, *φυλλον*, a leaf, being understood, a confirmation of which may be found under the 6th species of our article **MERCURIALIS**, above-mentioned. If we may be allowed to play further upon this word, we should remark that its own generation is truly *anile*. Yet hence arose Bauhin's *Mercurialis testiculata*, *sive mas*, and *spicata*, *sive femina*; appellations perversely bestowed on the two sexes of our *Mercurialis annua*, as well as of *perennis*. How Linnæus came to transfer *Thelygonum* to the genus which now bears it, can no otherwise be accounted for, than from the supposed affinity of the plants to each other, and both having borne the name of *Cynocrambe*, or Dog's Cabbage; a name retained by Gærtner, after Tournefort, and liable to no objection, except being composed of one already established, which doubtless caused Linnæus to reject it. The imaginary affinity just alluded to has apparently stamped a poisonous character on the herb before us, which, considering its natural order, is probably undeserved.—Linn. Gen. 494. Schreb. 644. Willd. Sp. Pl. v. 4. 420. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 285. Sm. Prodr. Fl. Græc. Sibth. v. 2. 237. Juss. 405. Lamarck Illustr. t. 777. (*Cynocrambe*; Tourn. t. 485. Gærtn. t. 75.)—Class and order, *Monoecia Polyandria*. Nat. Ord. *Scabridæ*, Linn. *Urticæ*, Juss.

Gen. Ch. Male. *Cal.* Perianth of one leaf, turbinate, coloured, cloven half way down into two revolute segments. *Cor.* none. *Stam.* Filaments numerous, from six to twelve  
or

or more, capillary, prominent, as long as the calyx, anthers versatile, linear, straight.

Female, on the same plant, *Cal.* Perianth minute, of two erect, lanceolate, acute, lateral leaves, permanent. *Cor.* none. *Pist.* Germen superior, globose; style lateral, between the calyx-leaves, thread-shaped, much longer than the germen; stigma simple, curved. *Peric.* none. *Seed* solitary, globose, seated on a callous annular receptacle, which falls off with it.

Eff. Ch. Male, Calyx in two revolute segments. Corolla none. Stamens about twelve.

Female, Calyx lateral, of two leaves. Corolla none. Style one. Seed naked, on a deciduous annular receptacle.

1. Th. *Cynocrambe.* Dog's Mercury. Linn. Sp. Pl. 1411. Willd. n. 1. Ait. n. 1. Sm. Fl. Græc. Sibth. t. 941, unpublished. (Cynocrambe Dioscoridis; Bauh. Prodr. 59. C. alfinefolia; Barrel. Ic. t. 335. Alfine facie planta nova; Column. Phyt. 28. t. 30. ed. alt. 120. t. 36.)—The only known species, found in waste ground and the fissures of rocks, especially in shady or moist places, in the south of Europe, as well as in Asia, flowering at almost all seasons. About Rome and Naples it is very frequent. Its seeds may have been brought, from time to time, into our curious botanic gardens, but the plant has no charms, nor any known quality, to render it a popular favourite. The root is annual, simple, cylindrical, with many fibres below. Stems several, spreading or prostrate, a span long, leafy, scarcely branched, round, very smooth and shining, mostly purplish. Leaves alternate, stalked, each with an axillary tuft of smaller ones, ovate, rather succulent, an inch, or thereabouts, in length, of a bright shining green, very smooth on both sides; roughish at the edges. Footstalks almost as long as the leaves, dilated at the base into an annular toothed stipula. Flowers small, whitish, from the bosoms of the upper leaves. The calyx of the males is not unlike the corolla of a honey-suckle in miniature. Seed purplish-brown, furrowed, not much bigger than mustard-seed. The general aspect of the plant evinces its affinity to *Parietaria*, though the flowers in detail are extremely different.—Dr. Sibthorp's figure has but six stamens. We have usually found more, and authors describe from twelve to nineteen.

That this herb is the *κυνια*, or *κυνοκραμβη*, of Dioscorides, there can scarcely be a doubt. He describes it sufficiently well, and informs us that it was sometimes called Wild Male Mercury; which renders the name of *Thelygonum* still more unsuitable; but Linnæus did not always search deeply into such matters, though he will commonly be found quite as learned as most of his critics or correctors. Dioscorides speaks of the plant in question as a gentle purge. This probably caused the *Mercurialis* to be taken with the same intention, though at the peril of the patient's life, as we have already mentioned in its proper place; where also it may be seen that some of the earlier European botanists took that very plant for the *κυνοκραμβη*.

THELYMITRA, from *θηλυ*, female, and *μιτρα*, a diadem, or ornament for the head. This name of Forster's, not one of the most happy, alludes to the cap or hood, ornamented with a pair of plummy tufts, and covering the immediate organs of fructification.—Forst. Gen. t. 49. Swartz Aët. Holm. 1800. 228. t. 3. f. L. Ejusd. in Schrad. Neues Journ. v. 1. 56. t. 1. f. L. Sm. Exot. Bot. v. 1. 55. Brown Prodr. Nov. Holl. v. 1. 314. Willd. Sp. Pl. v. 4. 79. Ait. Hort. Kew. v. 5. 200.—Class and order, *Gynandria Monandria.* Nat. Ord. *Orchideæ.*

Gen. Ch. *Cal.* Perianth of three equal, ovato-lanceolate, coloured leaves, exactly resembling the petals. *Cor.* Petals

two, ovato-lanceolate, the size of the calyx, and exactly like it. Nectary a sessile lip, of the shape, size, and appearance, of the petals and calyx, without a spur. *Stam.* Anther parallel to the stigma, permanent, of two cells close together, attached to the central lobe of a three-cleft hooded appendage to the column; "masses of pollen powdery, pendulous by a thread from the gland of the stigma." Brown. *Pist.* Germen inferior, obovate; style short, united with the hood; stigma in front, obtuse. *Peric.* Capsule obovate, furrowed, with one cell and three valves. Seeds numerous, chaffy.

Eff. Ch. Calyx-leaves coloured, the size and figure of the petals and lip. Column encompassed by a three-lobed hood. Anther parallel to the style, permanent.

1. Th. *Forsteri.* Forster's Thelymitra. Swartz Aët. Holm. 1800. 228. t. 3. f. L, c. Willd. n. 1. (Th. longifolia; Forst. Gen. t. 49. Serapias regularis; Forst. Prodr. 59.)—Lateral segments of the hood plumous: intermediate one vaulted. Cluster many-flowered.—Gathered by Forster in New Zealand. The stem is above a foot high, round, striated, somewhat spiral, clothed with a few sheathing lanceolate leaves. Cluster terminal, erect, three inches long, of about a dozen upright flowers, scarcely half the size of the next species, each accompanied by an elliptic-lanceolate acute bractea, longer than the partial stalk. Of the colour of the flowers we have no information. Their hood appears, by the dried specimen, as well as Forster's figure, to have its middle segment vaulted, convex, and undivided.

2. Th. *ixioides.* Large-flowered Thelymitra. Swartz Aët. Holm. 1800. 228. t. 3. f. L, a, b, d—g. Willd. n. 2. Br. n. 1. Ait. n. 1. Sm. Exot. Bot. v. 1. 55. t. 29.—Lateral segments of the hood plumous: intermediate one three-cleft; its lateral lobes jagged; central one shortest, cloven, crested at the back. Cluster many-flowered.—Found in the neighbourhood of Port Jackson, New South Wales, from whence we received specimens and drawings about the year 1790. Mr. G. Caley sent out plants to Kew in 1810, but they do not appear to have succeeded there. This is a larger taller species than the foregoing; its flowers above an inch in diameter, very handsome, of a fine blue, spotted, according to Mr. Brown, with a deeper colour. The hood is fringed with hairs, just below the summit, and overtopped by its two lateral, stalked, plumous tufts. The calyx, petals, and lip, spread almost equally in both these, and, we believe, all the following species, except our n. 9, Mr. Brown's *venosa*.

3. Th. *media.* Intermediate Thelymitra. Br. n. 2.—"Outer segments of the hood plumous; intermediate one naked at the back, three-cleft; its central lobe emarginate, half the length of the others. Spike (or cluster?) many-flowered."—Gathered by Mr. Brown, near Port Jackson.

4. Th. *canaliculata.* Channelled Thelymitra. Br. n. 3.—"Outer segments of the hood plumous: intermediate one naked at the back, many-cleft; lobes corrugated; the outer one longest and most remote. Spike many-flowered."—Found by Mr. Brown, in the tropical part of New Holland.

5. Th. *pauciflora.* Few-flowered Thelymitra. Br. n. 4.—"Hood half the length of the petals: its outer segments plumous: intermediate one naked at the back, emarginate, with rounded entire lobes. Spike of few flowers."—Gathered by Mr. Brown, near Port Jackson.

6. Th. *nuda.* Naked Thelymitra. Br. n. 5.—"Hood half the length of the petals; its outer segments plumous; intermediate one naked at the back, emarginate, with rounded entire lobes. Spike many-flowered."—Gathered in the island of Van Diemen, by Mr. Brown. By the above definition,

nition, this species differs from the last only in having more numerous flowers.

7. *Th. angustifolia*. Narrow-leaved Thelymitra. Br. n. 6.—“Outer segments of the hood plumous; intermediate one naked at the back, emarginate, with toothed lobes. Spike of few flowers. Leaf as tall as the flower-stalk.”—Found by Mr. Brown, in the neighbourhood of Port Jackson.

8. *Th. carnea*. Flesh-coloured Thelymitra. Br. n. 7.—“Calyx and petals spreading. Outer segments of the hood finely toothed, beardless. Stalk with one or two flowers.”—Found by Mr. Brown, near Port Jackson. A drawing in our possession, which seems to belong to this species, represents the stalk about four inches high, with a light-red terminal flower, above an inch wide, and a few short, radical, lanceolate leaves.

9. *Th. venosa*. Veiny Thelymitra. Br. n. 8.—“Calyx and petals converging. Outer segments of the hood beardless, spirally involute.”—Gathered also near Port Jackson, by Mr. Brown.

10. *Th. tigrina*. Tiger-spotted Thelymitra. Br. n. 9.—“Lateral segments of the hood distinct, with tufted beards; intermediate one shorter, crested. Leaves linear, channelled.”—Discovered by Mr. Brown, on the south coast of New Holland. The flowers are yellow, with darker spots.

11. *Th. fusco-lutea*. Brownish-yellow Thelymitra. Br. n. 10.—“Lateral segments of the hood converging, connected, fringed; intermediate one erect, naked. Leaves lanceolate.”—Gathered by Mr. Brown, in the same country with the *tigrina*. He describes the yellow colour of the flowers as peculiar to these two last species; all the rest, as far as hitherto discovered, having them generally blue, sometimes white, or flesh-coloured. We have necessarily, for want of authentic specimens, except of the first two species, adopted the specific characters of the excellent author whose name we have cited.—He establishes a genus under the name of *EPIBLEMA*, which appears to differ from *Thelymitra*, in having a stalked lip with tufts of fibres at its base; an appendage to the base of the column, connected with the claw of the lip underneath; and the anther accompanied at each side by a petal-like lobe. Of this there is only one species, *E. grandiflorum*, found on the south coast of New Holland. Its flowers are large, blue, and handsome.

**THELYPHONON**, from *θηλυς*, female, and *φονος*, murder, or destruction, the name of an herb mentioned by Pliny, book 25, chap. 10, which he says is by some called Scorpion, from the resemblance of its root to a scorpion, and the touch of which is fatal to that animal, as a remedy for whose sting it is given internally. He adds, that the same root kills any sort of quadruped, if applied to the parts of generation; and that its leaf, which resembles that of *Cyclamen*, produces the same effect within the course of a day. His description answers to the *Doronicum scorpioides*, Willd. Sp. Pl. v. 3. 2114; *D. latifolium*, Clus. Hist. v. 2. 16; Great Leopard's-bane, Ger. Em. 759; but there is apparently much superstition, mistake, or exaggeration, intermixed in his relation.

**THELYPTERIS**, from *θηλυς*, female, and *πτερις*, a fern, a name by which Pliny designates a species of the Fern tribe, whose habit appears to be more delicate than that of his *Filix mas*, or Male Fern. The latter should seem, by his description, to be our *Pteris aquilina*. (See **PTERIS**.) The name of *Filix mas*, however, has remained with a large species of *Aspidium*, Sm. Fl. Brit. 1121. Engl. Bot. t. 1458; and that of *Filix femina* with a more slender and finely-divided one of the same genus, Engl. Bot. t. 1459; while a third, whose texture is more thin and tender than either, has received the appellation of *Aspidium Thelypteris*. They were all referred by Linnæus, under the same specific names, to

**POLYPODIUM**. (See that article.) Our present *Thelypteris*, therefore, must not be taken for that of Pliny, being rather a north-country plant, not hitherto noticed in Greece by any botanical traveller.

**THEMA**, in *Ancient Geography*, a town of Syria, in the Chalibonitide territory; and also of Arabia Deserta.

**THEMAN**, a town of Arabia Petræa, 5 miles from Petra, which had a Roman garrison.—Also, a town of Judea, in the half-tribe of Manasseh, on the other side of Jordan; famed for the wisdom of its inhabitants. Elishaz, one of Job's three friends, came from this place.

**THEMAR**, in *Geography*, a town of Germany, in the county of Henneberg, on the Werra; 12 miles S.E. of Meiningen.

**THEME**, **THEMA**, a subject or topic, upon which to write or compose.

**THEME**, among *Astrologers*, denotes the figure they construct when they draw the horoscope; representing the state of the heavens for a certain point, or moment, required; *i. e.* the places of the stars and planets for that moment.

The celestial theme consists of twelve triangles, inclosed within two squares, and called the *twelve houses*.

**THEME**, in *Grammar*, denotes a verb, considered in its primary and absolute sense, and not limited to any particular mode or tense: or it is the verb in its primitive radical state, whence its different formations are derived.

**THEME**, in *Music*; *Thema*, Lat.; *Tema*, Ital.; *Mottivo*, *Soggetto*, is a series of notes selected as the text or subject of a new composition, or an old favourite and well-known air to grace and embellish with variations. About the middle of the last century, the musical world was overwhelmed with dull, unmeaning, and monotonous variations to old and new tunes, which consisted of nothing more than a regular multiplication of notes, without fancy, taste, or harmonical resources; till Haydn, in the slow and graceful middle movements of his quartets and symphonies, by a richness of imagination, by double counterpoint, and inexhaustible resources of melody and harmony, rendered variations the most ingenious, pleasing, and heart-felt of his admirable productions à grand orchestra; and Mozart, in a totally different style, and for a totally different purpose, has rendered little favourite French, Italian, German, and English airs the most beautiful, amusing, and useful compositions for the piano forte that have ever been produced since the invention of that instrument. More than twenty of these have been printed in England that were brought from Vienna by Mrs. Peploe, who played them, as she did all other music, with a firmness, accuracy, and spirit, which neither dilettante nor professor has ever exceeded.

These themes seem to have been a series of lessons, composed expressly to form the hand and taste of some disciple of the author, who promised to be a great performer. In every one of these themes, there are some peculiar difficulties of execution, refinement, and expression to vanquish, at which it is in vain for mediocrity to aspire.

**THEMEDA**, in *Botany*, a genus of grasses, so called from its Arabic name *Tbamed*.—Forsk. *Ægypt-Arab*. 178. Juss. 447.—It is found in Yemen, near Hadie. Forskall names the only species *T. triandra*, and describes it as follows.

—“A polygamous grass. *Spikelets* proceeding from a sheath, capitate; the outer ones whorled, male. *Calyx* of one valve, single-flowered. *Corolla* of two valves. *Styles* and *awns* wanting. In the middle of the head of flowers arises a short stalk, bearing two stalked male *spikelets*, and a sessile hermaphrodite one; the *calyx* is of one valve, *corolla* of two; *awn* proceeding from the receptacle, much longer than the flower.

*Stems racemose. Sheaths compressed, broad, sword-shaped, concealing the branches, and the heads of flowers, before expansion. All the heads are originally concealed in the sheath of a leaf."*

This can only be the Linnæan *Anthilivria*, a genus which Mr. Brown, in his *Prodr. Nov. Holl. v. 1. 200*, asserts to have been first described by Forskall, but he gives no reference to the *Themeda*, which omission has caused us much trouble, and after all, leaves the matter in some uncertainty. Desfontaines, in his *Fl. Atlant. v. 2. 380*, has reformed the character of *Anthilivria*, and has given a figure, t. 254, of *A. glauca*, called by some authors *Stipa paleacea*, which agrees, as nearly as possible, with Forskall's description. It does not appear that Vahl, Willdenow, or any other author, has adverted to *Themeda*, except Jusseu, who has merely admitted it, on Forskall's authority, into his appendix, without examination or elucidation.

We presume here to observe, that every correct writer ought invariably to cite the page of his author; especially in referring to a confused posthumous work, without an index, like that of Forskall.

THEMIS, in *Ancient Geography*, a town of Africa Pro-pria, situated between Tabraca and the river Bagradas.

THEMIS, in *Geography*, a river of Transylvania, which runs into the Alaut, near Marienburg.

THEMIS, in *Astronomy*, a name given by some to the third satellite of Jupiter.

THEMIS, in *Mythology*, the daughter of Cœlum and Terra, or of Uranus and Titaia, the eldest sister of Saturn, and aunt of Jupiter.

Themis, according to Diodorus, established divination, sacrifices, the laws of religion, and every regulation that contributed to maintain order and peace among men. She also applied herself to astrology, issued predictions, and after her death temples were erected to her, in which oracles were delivered. She had a temple on mount Parnassus, and another in the citadel of Athens.

THEMISCYRA, in *Ancient Geography*, a town of Asia Minor, in the kingdom of Pontus, situated in the open country to which it gave name, upon the banks of the river Thermodon, towards its mouth in the Euxine sea. Diodorus Siculus says that it was a royal city of the Amazons, and that they founded it.

THEMISONIUM, a town and country of Asia, in Phrygia.

THEMISSUS, a town of Asia Minor, in Caria.

THEMISTEAS, a promontory of Asia, in Carmania.

THEMISTIUS, surnamed *Euphrades*, or the fine speaker, in *Biography*, an Eclectic philosopher, was born in an obscure village of Paphlagonia, about the year 317, and having fixed his residence at Constantinople, taught eloquence and philosophy with great reputation and success. His disciples, both Pagan and Christian, were numerous; to the former class belonged Libanius, and to the latter, Gregory Nazianzen. By the emperors he was highly esteemed, and they conferred upon him distinguished honours. In the year 355, Constantius admitted him into the senate; and in return for an eloquent eulogium, presented him with a brazen statue. Julian corresponded with him as a friend; and in 362, appointed him prefect of Constantinople. His character and eloquence induced other emperors to bestow upon him peculiar favours. When Jovian issued his edict of toleration, Themistius was deputed by the senate to express its loyalty; and on this occasion he expatiated with elegance and liberality on the rights of conscience, and the independence of the human mind. Of his candour and liberality, the following memo-

orable instance is recorded by Socrates, Sozomen, and other ecclesiastical historians. The emperor Valens, who favoured the Arian party, treated the Trinitarians with great severity. Themistius, disapproving the measures which the emperor pursued, addressed him in an eloquent speech, stating that the diversity of opinions among Christians was inconsiderable, compared with that of the Pagan philosophers; and urging upon his attention, that this diversity could not be displeasing to God, since it did not prevent men from worshipping him with true piety. By such arguments, Themistius, it is said, prevailed upon the emperor to treat the Trinitarians with greater lenity. What an example does this Pagan philosopher exhibit even to Christian divines! In the year 376 Themistius visited Rome, but though solicited to take up his abode there, he preferred returning to Constantinople. It redounds very much to the honour of this philosopher, and also to the liberal sentiments of Theodosius the Great, that during his visit to the Western empire, the emperor entrusted Themistius, notwithstanding difference of religion, with the care and education of his son Arcadius. Themistius was no less distinguished by gentleness of temper and urbanity of manners, than by his eloquence and wisdom, and ability in the conduct of public affairs. After a long course of civil honours, he withdrew about the year 387, at an advanced age, from public business; and soon after died. Themistius, the subject of this article, who does not appear to have ever deserted the Pagan schools, should be distinguished from a Christian deacon of the same name, who lived after the council of Chalcedon, held in the year 551, and who was the head of the sect called *Agnosta*; which see. As a philosopher, Themistius illustrated several of the works of Aristotle, particularly the *Analytics*, the *Physics*, and the book on the *Soul*, in commentaries, written with great perspicuity and elegance. His "Orations," which were thirty-six, and of which thirty-three are still remaining, are strongly marked with the same characters. The best editions of his Orations are those of Petau, Gr. and Lat. Paris, 4to. 1618; and of Hardouin, Gr. and Lat. Paris, fol. 1684. Fabr. Bib. Græc. Brucker by Elfeld. Gibbon. Lardner's Works, vol. viii.

THEMISTOCLES, an Athenian statesman and commander, the son of Neocles, a person of middle rank at Athens. At a very early age he manifested, both in his amusements and in his literary pursuits, those views and inclinations, which marked the character and destiny of his maturer years. To those who ridiculed him on account of his apparent contempt of ornamental accomplishments, he replied, "It is true, I never learned how to tune a harp, or play upon a lute; but I know how to raise a small state to a great one." Ambition seems to have been his ruling passion, and he lost no opportunity of acquiring military and political distinctions. He sought popularity with a view to his personal advancement; and less pure and disinterested in his principles than Aristides, his solicitude for the glory of his country was subservient to his own reputation and eminence. After the defeat of the Persian invasion by the battle of Marathon, an event which interested his feelings and roused into exercise his predominant love of glory, he foresaw that the attempt might be renewed by sea as well as by land; and he therefore exerted his influence in rendering the Athenian state a naval power. With this view, he induced his countrymen to appropriate the revenue accruing from the silver mines to the equipment of a number of galleys; and as he possessed the chief authority at Athens, in consequence of the banishment of Aristides, he found no obstacle to the execution of his design. In the course of three years after this event, the hostile preparations of Xerxes for an expedi-

tion into Greece to enforce the demand of subjection, furnished him with a plea for urging the Grecian states to compromise their mutual dissensions, and to unite in defending themselves against the invader. In the choice of a general, with whom the command should be intrusted in this emergency, the Athenians favoured the claims of a democratical orator, named Epicycles, who had fascinated them by his eloquence; but Themistocles induced him to surrender his pretensions to an office for which he was totally unqualified by a bribe, and thus secured the appointment for himself without a competitor. When news arrived that the Persian army, conveyed by a fleet, was approaching the straits of Thermopylæ, Themistocles proposed that the Athenians should fit out their galleys and sail to meet them; but this counsel being rejected, he took the command of their troops, and having joined the Lacedæmonians, marched towards Tempé. In the mean while, intelligence was received that the passage of the straits had been forced, and that Bœotia had submitted to the invaders; and upon this alarm the army returned without seeing the enemy. In these circumstances of apprehended danger, the Athenians, according to their customary practice, had recourse for counsel to the Delphic oracle. The answer, probably suggested by Themistocles himself, was, that they should rely solely on their fleet. It was now proposed, that the city should be wholly abandoned to the Persians, without any attempt for its defence; that the women, children, and aged should be removed to some place of security; and that all who were able to bear arms, should embark on board the galleys, and watch the event. A decree was obtained, after much fruitless opposition, to this purpose; and this was followed by another, which permitted all exiled citizens to return. Aristides was one of this number, who nobly sacrificing, in the moment of his country's danger, all private animosities, concurred in all the spirited measures of his former rival.

Eurybiades, a Spartan, to whom the command of the confederate fleet was assigned, and who was very unequal to the office, differed with Themistocles as to the measures proper to be pursued; and behaved with an insolence, which, probably for the sake of the public service, the latter did not think proper to resent. Eurybiades was pacified by the gentleness and self-command of Themistocles, and convinced by his reasoning. Finding it prudent, however, to change the measures which he originally contemplated, he employed a stratagem to induce the Persians to advance and make an attack. This was followed by the famous battle of Salamis, which took place in the year B.C. 480, and which terminated in the signal defeat of the Persian navy. The victory has been chiefly ascribed to the skill and valour of Themistocles; and having thus succeeded, he advised the confederates to sail immediately to the Hellespont, in order to destroy the bridge of boats by which the army of Xerxes had passed over, and thus to intercept his communication with Asia; but being overruled in this proposal, he dispatched a secret messenger to the Persian king, with information that the Greeks intended to break his bridge, and advising him to retreat immediately before the design was executed. The policy of Themistocles, as we may judge from this instance, was not always uniform and consistent; and in another case, which remains to be mentioned, on the authority of Plutarch, it was inexcusably flagitious. When the combined Grecian fleet was wintering at Pegasa in Magnesia, he informed the Athenians, that he had conceived a project which would be of infinite service to the republic, and at their desire, he would communicate it to Aristides. This virtuous man told them, that the scheme of Themistocles would be highly advantageous, but that nothing could be

more unjust; upon which, very much to their honour, they determined not to adopt it. The plan was to burn all the ships of the fleet, except those of Athens, by which she would remain complete mistress of the seas.

The victory at Salamis advanced the name and character of Themistocles to the highest pitch of glory throughout Greece. On his visit to Sparta, he was received with every token of respect; and whilst the first prize of valour was decreed by the people to their countryman Eurybiades, the olive wreath of superior wisdom was placed on the head of the Athenian; and they also presented him with a magnificent chariot, and ordered three hundred of their youth to attend him back to the borders. At the next Olympic games, the eyes of the whole assembly were fixed upon Themistocles, and he was pointed out to strangers as the most interesting object at the spectacle. Themistocles himself acknowledged, that this was the noblest day of his life. When the constitution of Athens was about to be re-established, after the rebuilding of the city, Themistocles, in conformity to the political principles which he had adopted, proposed that every citizen should have an equal right to participate in the government, and that the members should be chosen from the body of the people, without distinction; and in his proposals the people unanimously acquiesced. He also proposed to fortify the city; but as the Lacedæmonians objected to the proposal, he was deputed upon an embassy to Sparta with a view of conciliating them. He contrived, however, by various artifices, to prolong the negotiation, so that the Athenians had constructed their walls before the Spartans were duly apprized of the fact. Themistocles vindicated this artifice by alleging, "that all things are lawful in serving our country;" and the Spartans, admiring his patriotism, silently acquiesced. In the following year, his scheme for rendering the Pyræum the principal port of Athens, and connecting it with the city by long walls, was adopted and accomplished.

Independently of the deceits which Themistocles had practised with regard to the Lacedæmonians, another circumstance had occurred which increased their enmity against him. He had successfully opposed their sending deputies to the Amphictyonic council, and thus degraded their authority in Greece. Incensed against him, they joined his rivals at Athens, and used all their influence to destroy his reputation. His own conduct also had excited jealousy and resentment; for he had caused to be erected near his own house a temple to "Diana Aristobule," or "of the best counsel," thus intimating, that his counsels had been the best for the Grecian community. His enemies prevailed, and procured his banishment from Athens by the sentence of Ostracism. During his exile at Argos, his enemies gained an additional advantage over him. Apprized of the treasonable designs of Pausanias, the Spartan, against the liberty of Greece, he declined the disclosure of them; and after the detection and death of Pausanias, letters of Themistocles were found, which proved that they had conferred on this business. The Lacedæmonians preferred an accusation against him to the Athenians; and they called him to account in the presence of the states of Greece. Dreading a trial, he fled to Corcyra, and thinking himself insecure there, he withdrew to Epirus: and at length was reduced to the necessity of seeking the protection of Admetus, king of the Molossi, whom he had formerly offended. The vengeance of the Spartans pursued him, and Admetus was threatened with a war, if he protected the criminal. The king dismissed him with money across the continent to a port in the Ægean sea, whence he reached Asia in safety. In the year B.C. 462, he arrived at the Persian court; but here

his name was so obnoxious, that a reward of 200 talents had been offered for apprehending him. Here he appeared in disguise, and pretending that he had important information which he wished to communicate to the king in person, he was admitted to the royal presence, and favourably received: the 200 talents, which were the price of his head, were paid to himself, and a more ample recompence was offered to him, if he would give useful information concerning Greece. He was granted time for acquiring the Persian language, and after a year he appeared at court like a native. The king and royal family treated him with distinction; and it is said that the revenues of three cities, viz. Magnesia, Lampsaecus, and Myus, were assigned him, under the name of bread, wine and meat; and as some say, two more, for lodging and wardrobes. In this state of luxury and magnificence he was joined by the members of his family, who had been conveyed to him by his friends, and to them he expressed a kind of satisfaction with his condition, which proves that moral meanness may accompany exalted talents.

The close of his life is involved in obscurity. Plutarch relates, that upon the revolt of Egypt, supported by the Athenians, against the Persian dominion, the Greek king, resolving to send an expedition into Greece, dispatched an order to Themistocles at Magnesia, reminding him of his promises, and claiming the fulfilment of them: upon which it is said, that, in order to avoid the disgrace of bearing arms against his country, after sacrificing to the gods and taking solemn leave of his friends, he drank poison, and died in that city at the age of sixty-five years. Thucydides, his contemporary, says that he died of a distemper; and others again report, that he poisoned himself, because it was not in his power to accomplish what he had promised. The Magnesians honoured his memory with a sumptuous tomb; but his remains, according to his own orders, were privately conveyed to Attica, where they were interred. It is further said, that the Athenians, repenting of their treatment of him, raised a tomb for him in the Pyræum, which was an interesting object to all who visited that port. His singular talents, and the services which he rendered to his country, must be acknowledged; and those who think favourably of him, ascribe his desertion of them to unjust persecution. But in Themistocles we look in vain for the virtues of an Aristides; and he can only be allowed the honour of a distinguished general and statesman. Thucydides. Plut. in Them. Ancient Un. Hist.

**THEMNA**, **TIMNA**, or *Thamnata*, in *Ancient Geography*, a town of Palestine, in the tribe of Dan. Josh. xix. 43.—Also, a town of Arabia Deserta, on the confines of Mesopotamia.

**THEN**, in *Geography*, a river of France, which runs into the Weze, near Francremont.

**THENA**, in *Ancient Geography*, an ancient town of Africa, situated N.E. of the Tanais and near it, and two miles in circuit.—Also, a town of Samaria, in the vicinity of Sichem.

**THENAC**, or **THANAC**, a royal town of Judæa, in the half-tribe of Manasseh, on this side of Jordan. It was given to the Levites of this tribe, and its king was one of those who were vanquished and slain by Joshua.

**THENÆ**, a town of the isle of Crete, near Cnossus.

**THENAR**, in *Anatomy*. The eminence in the palm of the hand, formed by the muscles of the thumb, has been called thenar: and some of the muscles have been described under the same name.

The thenar of Riolan and Winslow includes the abductor pollicis brevis, and the opponens pollicis.

**THENEATE** *el Gannim*, the *Sheep Cliffs*, in *Geogra-*

*phy*, mountains of Africa, in Sahara; 90 miles S. of Algiers.

**THENEZAY**, a town of France, in the department of the Two Sevres; 10 miles N.E. of Partenay.

**THENGEN**, a town of Germany, which gives name to a principality, situated in the Hegau, bordering on Schaffhausen; 8 miles N. of Schaffhausen.

**THENON**, a town of France, in the department of the Dordogne; 6 miles N.W. of Montignac.

**THENONGOUN**, a town of the Birman empire; 4 miles S.W. of Ava.

**THENOPSYCHITES**. See **TINETOPSYCHITES**.

**THENSA**, among the Romans, a veil or canopy, used in the chariots of games; and likewise to cover a seat of state.

Thensæ could not be granted to any but by the express allowance of the senate. Hist. Acad. Inscript. vol. i. p. 359.

**THEOBALD**, **LEWIS**, in *Biography*, a professed writer, was the son of an eminent attorney at Sittingbourn, in the county of Kent, and is here noticed as one of the numerous editors of Shakspeare. Of his various works, critical, poetical, and dramatic, it is needless to give any account, as they have sunk into oblivion. He had the misfortune of becoming, to an undue degree, the object of Mr. Pope's contempt and satire, and of having the first place assigned him in the Dunciad, though he was afterwards superseded by Cibber. His edition of Shakspeare was preceded by a work entitled "Shakspeare restored," and published in 1726; and also by that of Mr. Pope. It is thus characterized by Dr. Johnson: "Pope was succeeded by Theobald, a man of narrow comprehension and small acquisitions, with no native and intrinsic splendour of genius, with little of the artificial light of learning, but zealous for minute accuracy, and not negligent in pursuing it. He collated the ancient copies, and rectified many errors. A man so anxiously scrupulous might have been expected to do more; for what little he did was commonly right." Of the tragedy which he brought on the stage, and which is entitled "The Double Falsehood," the greater part is ascribed by him to Shakspeare; but Dr. Farmer has proved that this is a mistake.

**THEOBROMA**, in *Botany*, the Chocolate-tree, received that name from Linnæus, who probably, like the president Bachot, cited by De Theis, was fond of the delicious produce of this tree; for the word is formed of θεος, a god, and βρωμα, food. A French writer, M. Tussac, in his magnificent Flore des Antilles, has objected to the above generic name, for a reason which we confess to have been one of the last we should have thought of; that "it carries with it the signification of a quality, and seems therefore more fit for the name of a species." Surely nothing can be more desirable than a generic appellation which conveys information; on which account *Amaranthus*, *Artocarpus*, *Biferrula*, are excellent; we need not run through the botanical alphabet in search of numerous others. Such probably was the origin of most names, in every language, and who can tell that the American word *Cacao*, substituted, or rather restored, by Tussac, may not express some quality of the plant? Neither is it an objection to any significative generic names, that they express merely some general property or peculiarity, not found in every one of the species, witness *Urtica*. The idea of stinging is associated with the name of a Nettle; like redness with that of a Rose; though there are Dead Nettles, and White Roses.—Linn. Gen. 391, with an erroneous description, corrected in Linn. Suppl. 341. Schreb. 513. Willd. Sp. Pl. v. 3. 1422. Mart. Mill.

Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 408. Juss. 276. Lamarek Illustr. t. 635. (Cacao; Tourn. t. 444. Gærtner. t. 122.)—Clas and order, *Polyadelphia Decandria*. Nat. Ord. *Columniferae*, Linn. *Malvaceae*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of five ovato-lanceolate, acute, spreading, coloured, deciduous leaves. *Cor.* Petals five, rather longer than the calyx; their claws dilated, concave, hooded, marked internally with two ribs from the base, and one from the summit: their borders roundish-ovate, pointed, spreading, each contracted at the base into a narrow, erect and recurved stalk, connected with the claw. Nectary short, cup-shaped, crowned with five long, erect, awl-shaped, pointed, equal, converging segments. *Stam.* Filaments five, thread-shaped, erect, recurved at the upper part, concealed in the hollow claws of the petals, inserted into the outside of the nectary between its segments, but not above half so long; anthers two to each filament, (one on each side, at the summit,) vertical, two-lobed, one lobe over the other. *Pist.* Germen superior, nearly sessile, ovate, with five furrows; style cylindrical; stigma in five awl-shaped segments. *Peric.* Berry elliptic-oblong, beaked, coated, of one cell. *Seeds* large, ovate, smooth, numerous, in five rows; their cotyledons in many deep lobes.

Eff. Ch. Calyx of five leaves. Petals five, vaulted at the base. Nectary cup-shaped, with five taper points. Anthers two to each filament. Stigma five-cleft. Berry coated. Seeds ovate.

Obf. Gærtner observes that he could find no traces of the five cells attributed by authors to this fruit. It is probable, however, from analogy, that they may exist in the germen, and Aublet's account is sufficiently explicit of their presence in the fruit. The drawing in the Linnæan herbarium, which appears to have been sent by Allamand from the West Indies, has led us to suppose each filament bore four anthers; but it seems there are only two, each of two round, distinct, vertical lobes, as represented by Aublet, t. 275, and copied by Lamarek. The order of *Decandria* must therefore be restored in the class *Polyadelphia*. See Sm. Intr. to Bot. ed. 3. 340. Linnæus's characters of *Theobroma* in Gen. Pl. were taken chiefly from Plumier's *Guazuma*, the *BUBROMA* of Schreb. Gen. 513; see that article. He has left a more correct description in manuscript, from which perhaps his son composed what is given in the *Supplementum*. From these sources, with the help of Allamand's drawing, and what is to be found in Aublet and Schreber, we have drawn up our account, having no opportunity of examining a flower.

1. *Th. Cacao*. Smooth-leaved Chocolate-tree. Linn. Sp. Pl. 1100. Suppl. 341. Willd. n. 1. Ait. n. 1. (*Th.* n. 2 and 3; Browne Jam. 306. Cacao; Merian. Surin. t. 26 and 63. *C. Theobroma*; Tuffac Flore des Antilles, t. 13. *Arbor cacavifera americana*; Pluk. Almag. 40. Phyt. t. 268. f. 3.)—Leaves entire, smooth on both sides.—Native of South America. Miller appears to have had this plant alive at Chelsea, but it has never long succeeded in our stoves; being extremely tender, even in some parts of the West Indies. Browne says the Chocolate-trees, though naturalized in the woods of Jamaica, are very delicate, and rarely survive when once they are loosened in the ground by hurricanes. (See CHOCOLATE.) These trees are the size of a middling apple-tree, but seldom exceed six or seven inches in diameter. They are very beautiful, especially when laden with fruit, which is dispersed, on short stalks, over the stem, and round principal branches; its yellow hue and warty surface somewhat resembling a citron. The leaves are alternate, stalked, drooping, a foot long, and three inches broad, elliptic-oblong, pointed, entire, slightly wavy,

very smooth on both sides, with one mid-rib, and many transverse ones, connected by innumerable, minute, reticulated veins. *Footstalks* round, hairy, an inch long. *Stipulas* minute, deciduous. *Flowers* small, several together in tufts, at the sides of the branches, on simple stalks, only one in each tuft, commonly producing fruit. *Calyx* light rose-coloured. *Petals* yellow.

2. *Th. guianensis*. Downy-leaved Chocolate-tree. Willd. n. 1. Ait. n. 1. (Cacao guianensis; Aubl. Guian. v. 2. 683. t. 275.)—Leaves wavy, and somewhat toothed; downy beneath.—Native of marshy woods in Guiana, bearing flowers and fruit in September. Of rather more humble growth than the foregoing. The leaves are, at most, but eight inches in length, and three in breadth; their margin wavy, or rather bordered with shallow teeth, towards the extremity; their upper surface smooth and green; the under clothed with short, ash-coloured, or rusty pubescence, and reticulated with fine veins. *Footstalks* short, channelled, downy. *Flowers* situated like the former. *Calyx* green without, yellow within. *Petals* yellowish. *Fruit* elliptical, with five angles, and clothed with short rusty down. Aublet says it has five cells, separated by membranous partitions; the seeds enveloped in a gelatinous, white, melting substance; their kernel white, very good eating when fresh. He speaks of this species as the Chocolate of Guiana, though he mentions a *Cacao sativa*, with entire leaves, as a cultivated kind, under which he cites *Theobroma Cacao* of Linnæus, and its acknowledged synonyma.

Aublet has also a *Cacao sylvestris*, v. 2. 687. t. 276, with entire leaves, downy beneath, and a downy fruit, without ribs. Willdenow asserts, we know not on what authority, that this last is *Duroia Eriopila*, Linn. Suppl. 209, of which we, unfortunately, have met with no specimen. A branch of Aublet's plant, communicated from his own herbarium by sir Joseph Banks, appears a variety of the last, its leaves being obscurely toothed in a similar manner; but for want of flowers we cannot say how far it answers to *Duroia*, between which and *Theobroma* there is no affinity in that respect. Aublet clearly describes his as a *Theobroma*, and we cannot help suspecting some error in Willdenow, as well as, possibly, a disagreement between Aublet's figure and our above-mentioned specimen, which latter may be, as above hinted, his *Cacao guianensis*. At any rate, the two species of *Theobroma* which we have described, are certainly and permanently distinct.

*THEOBROMA*, in *Gardening*, contains a plant of the exotic tree kind, of which the species usually cultivated is the chocolate nut-tree (*T. cacao*).

In its natural state, this tree produces a nut or fruit which is smooth, of a yellow, red, or of both colours, about three inches in diameter: it has a fleshy rind, near half an inch in thickness, which is flesh-coloured within: the pulp being whitish, of the consistence of butter, separating from the rind in a state of ripeness, and adhering to it only by filaments, which penetrate it, and reach to the seeds. Hence it is known when the seeds are ripe by the rattling of the capsule when it is shaken: the pulp has a sweet and not unpleasant taste, with a slight acidity; it is sucked and eaten raw by the natives; it may be easily separated into as many parts as there are seeds, to which it adheres strongly, and they are wrapped up in it, so that each seed seems to have its own proper pulp: the seeds are about twenty-five in number: when fresh, they are of a flesh-colour: gathered before they are ripe, they preserve them in sugar, and thus they are very grateful to the palate: they quickly lose their power of vegetation, if taken out of the capsule, but kept in it, they preserve that power for a long time: the tree bears

bears leaves, flowers, and fruit all the year through; but the usual seasons for gathering the fruit are June and December: in two years from the seed, the tree is above three feet high, and spreads its branches, not more than five of which are suffered to remain. Before its third year is complete, it shews for fruit; a tree yields from two to three pounds of seed annually. Such trees are of course very productive.

*Method of Culture.*—It is increased by seed obtained from abroad, sowing it as soon after its arrival as possible, in pots filled with light earth, and plunging them in a bark-bed, where they will soon come up; and when the plants are about three inches high, potting them off separately, and replunging them in the bark-bed in the stove, managing them as other woody exotics of the stove kind afterwards. They afford an agreeable variety in stove collections.

This tree is cultivated to considerable extent, and with very great attention in its native situations in the hot parts of America, for the sake of its fruit, the kernels of which are much used in the making of chocolate there, as well as in this country. In this intention, they are first brought to a pulverizable state by drying or roasting in a proper apparatus; they are then reduced into a fine powder by mills or other contrivances: after which, this fine powder is wrought up into a paste with orange-water, milk, and other liquids, and has sugar, different sorts of aromatic spices, and some aromatic perfumes, mixed and incorporated with it, when it is formed into cakes, or made into pretty large rolls, for exportation and sale in the European and other markets, if prepared in the places of its native growth.

It is employed somewhat in the manner of coffee as a fine rich breakfast article of diet, and used pretty extensively for that purpose in this and some other countries.

**THEOCATAGNOSTÆ**, formed from  $\Theta\epsilon\omicron\varsigma$ , *God*, and  $\kappa\alpha\tau\alpha\gamma\iota\nu\alpha\sigma\tau\iota\kappa\iota$ , *I judge, or condemn*, a sect of heretics, or rather of blasphemers, who presumed to find fault with certain words and actions of God, and to blame many things in the Scriptures.

Marshall, in his Tables, places these heretics in the seventh century; for what reason we know not. Damascenus is the only author that mentions them, but without taking any notice of the time of their appearance.

**THEOCRACY**, formed from  $\Theta\epsilon\omicron\varsigma$ , *God*, and  $\kappa\rho\alpha\tau\omicron\upsilon$ , *power, empire*, a state governed by the immediate direction of God alone.

According to Josephus, the ancient government of the Jews was theocratic; God himself ordering and directing every thing belonging to the sovereign authority.

By the oracle of Jehovah himself, all laws were enacted, war was proclaimed, and magistrates were appointed; in which three particulars the *summa potestas*, or sovereign authority, of any state, consists. And as Jehovah was the king, as well as the God of Israel, the priests and Levites, who were the stated attendants on his presence, and to whom the execution of the law in many cases was committed, were properly ministers of state and of civil government, as well as of religion. The sacrifices also, beside their religious use, were intended for the support of the state, and civil government.

This theocracy lasted till the time of Saul; when the Israelites, weary of it, desired they might have a king like other nations; and thence forward the state became monarchic.

There was also a kind of imaginary theocracy at Athens: while the sons of Codrus were disputing the succession, the Athenians, wearied out with the miseries of an intestine war,

abolished the royalty, and declared Jupiter the only king of the people at Athens.

**THEOCRITUS**, in *Biography*, a Greek poet, esteemed as the model of pastoral poetry, was a native of Syracuse, and the son of Praxagoras and Philina. The time in which he flourished is ascertained by two of his poems, one addressed to Hiero, king of Syracuse, who began his reign about the year B.C. 265, and the other to Ptolemy Philadelphus, whose reign comprehended the interval between 281 and 246 B.C. Although Hiero is reported to have been a patron of literature, persons of rank, as we may infer from Theocritus's poem, did not follow his example, at least in granting encouragement to poets; and therefore Theocritus left Sicily, and visited the court of Ptolemy Philadelphus at Alexandria, on whom he pronounces a splendid eulogy. The compositions of this poet are denominated "Idylls;" they are written in the Doric or rustic dialect, and few of them are pastorals, though most of them relate to rural life and manners. The purely pastoral are distinguished by the truth and simplicity of the manners, descending sometimes even to coarseness, and the pleasing description of natural objects, drawn from the life. To those who have a taste for genuine simplicity, and the beauties of nature, says one of his biographers, the poetry of Theocritus is highly agreeable. The most esteemed editions of his works, are D. Heinsius's, 4to. Commel. 1604; R. West's, Oxon. 8vo. 1699; Th. Warton's, Oxon. 2 vols. 4to. 1770; Valkenaer's, cum Bione et Moscho, Lugd. Bat. 8vo. 1779. Suidas, Vossius. Gen. Biog.

**THEODOLITE**, or **THEODOLET**, is an instrument used for measuring horizontal and vertical angles in land-surveying. This instrument was at first made on a small portable scale, supported by a tripod that will shut up into the form of a walking-stick, when the mechanism of brass-work is dismounted: and the state of dividing circles is now brought to that perfection in England, that small portable theodolites are still in use among land-surveyors, who confine themselves to the planning of single estates, for which these instruments are competent; but for surveys on a large scale, such as county surveys, or trigonometrical measurement of distant stations, theodolites of an enlarged construction have been used with corresponding advantage. Out of the numerous modifications of this instrument, that different artists have contrived, we propose to select two for particular description, which are generally considered as the best for accurate surveys; one by Ramsden, and the other by Troughton. We will begin with that large instrument already referred to in a former article, which was made by Ramsden, in the year 1777, for the use of general Roy, when he undertook his grand trigonometrical operations, and which is described in the 80th vol. of the Philosophical Transactions of London (1790), with all the constituent parts given separate in four large plates. A similar instrument, by the same maker, has since been used for the grand general survey of the different counties, by Messrs. Mudge and Dalby. *Plate VIII. fig. 1. of Surveying*, shews the perspective view of this masterpiece of workmanship, nearly as represented in general Roy's third plate; but his account, having reference to the several plates, will not answer our purpose. The stand on which the instrument is placed for use, is a four-legged mahogany stool A B C, placed as seen in the figure, with an octagonal top perforated at the centre by a hole of nine inches diameter. This stool or stand, when used, has its feet screwed fast to the tops of four piles driven into the ground, and nicely levelled, before the instrument is placed

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placed on it, and one of the four fastening screws may be seen at B, at the junction of the bracing bars. Upon this stood another, but larger, octagonal board of mahogany, DE, rests, which has a ring or circular curb on its plane, about half an inch from the sides of the octagon: this upper octagonal board may be fixed to, or released from, the top of the stand by four vertical screws, which penetrate both boards, but which allow one to slide over the other, so as to be either concentric or excentric, as the adjustment of a plumb-line to the mark or hole under the instrument may require, for the exact place of the station, over which the centre of the instrument must be exactly fixed. The four horizontal screws of adjustment, of which three are seen at F, F, and F, carried by the board DE, are so contrived as to effect this adjustment by pressure against the edge of the stand, after which the two octagonal boards are made fast together by the said four vertical screws not shewn. The upper octagonal DE has an open conical socket of brass, three inches in diameter, in its centre. Next above the board DE, thus adjusted and secured, comes the third board, which is circular, and which forms the basis of the instrument. In the centre of this base another brass conical socket, three inches and a quarter in diameter, is made fast, and slips over the smaller conical socket of the board DE of adjustment for central position, so that the centre of the instrument being concentric with this board partakes of the adjustment, while the plumb-line descends through both sockets down towards the ground. The large mahogany circle GH, of more than three feet in diameter, is supported by several pillars connected with the circular board, which we have called the base of the instrument, and forms with them a balustrade, that protects the instrument, as seen in the figure. A brass circle of three feet diameter, within the balustrade, is attached by ten strong conical radii to the large vertical hollow axis, formed into the frustum of a cone, of twenty-four inches in height above the metallic wheel, which we shall in future denominate the graduated circle, when considered with its radii and hollow axis attached to it. This axis, by way of distinction, may be called the *exterior* axis; it has a collar of cast-steel driven fast into the cavity of its inferior or thicker end, and a plate of bell-metal, with a sloping edge, surmounts the superior end, which plate may be raised or lowered by means of five screws acting vertically. The instrument stands on three short feet near D and E, and at an equidistant point not seen behind, which feet are firmly united together, at the place where they branch off, by a circular strong plate of bell-metal, upon which is carried an attached vertical cone of metal smaller than the former one, and as it fills the cavity of the other, we will call it the *interior* conical axis; the exterior one being moveable round the interior one without the least perceptible liberty, beyond what is necessary for rotatory motion. On the vertex of this interior axis is inserted a cast-steel pivot with sloping cheeks, which, entering the central hole of the bell-metal plate, exactly fits its cheeks there, while the bell-metal base of the interior axis fits the cast-steel collar inserted into the lower extremity of the exterior conical axis. This mode of centering allows the wheel to be taken off and put on without injury, and is also free from the objection that applies to those large instruments that have the superior end of the vertical axis supported in a frame that is liable to alter in its dimensions by exposure to the sun; of which imperfection, as we have noticed in our article CIRCLE, PIAZZI had great reason to complain. Besides, this kind of centre-work allows of carriage from one place to another, without any danger of injury being done to the instrument when properly packed. There are two achro-

matic telescopes with double object-glasses of each thirty-six inches focus, with eye-pieces of different powers both for erect and inverted positions. One of these telescopes lies across the body of the instrument, with the ends seen between the opposite pillars of the balustrade, the use of which is to watch the position of the instrument during the time of an observation being made; and, therefore, it requires but little elevation in altitude: the other is mounted, exactly like a transit-instrument, over the top of the exterior vertical axis, and has a semi-circle attached to the extreme end of its horizontal axis of motion, of six inches radius, and graduated for shewing angles of altitude or of depression. The Y's in which the pivots of the upper telescope move, are supported by the horizontal bar IK, which is braced by the ladder-pieces attached to the thick part of the exterior conical axis, and made fast to the top of this axis by its socket, as seen in the section in *fig. 4*; which section exhibits moreover the internal fittings of both the internal and external axes at their superior ends. This upper telescope has a spirit-level with the usual adjustments at the Y's, and at the bar of suspension for the horizontal position; and, as it will reverse in the Y's, and has moveable wires in the focus of the eye-piece, it may also be adjusted by a horizontal mark for collimation, and for taking exact altitudes, (as well as for taking minute angles of elevation without the semi-circle by the motion of the micrometrical wires,) when the level is applied to a rod on the *side* of the tube, as is the case in our drawing. When these adjustments are made, by dividing the errors between the proper screws, as usual, the level is hung to the cross-bar IK to watch its position while this telescope is used, and when both telescopes continue to bisect the same distant mark during an observation, with the bubble of the level in the middle, it is a proof that the instrument keeps its position. When a star or other object is viewed by night, the illuminating lamp K throws light into the axis of the telescope, which has a diagonal perforated reflector, as is usual in transit telescopes. A system of darkening prisms is also applied to the same end of the axis to regulate the quantity of light that shall come to the eye. All these adjustments and appendages have been minutely explained under our articles CIRCLE and TRANSIT-Instrument, and therefore need not be detailed in this article; but it may be proper to observe, that the semi-circle has a moveable clamping-piece, bearing the steel arbor of a vertical screw, the lower end of which falls on a polished piece of steel on the plane of the horizontal bar IK, the use of which clamp and screw is not only to give a slow motion in altitude, but to allow the preponderating eye-end of the telescope to rest steady thereon, while the observation has been read and repeated. The observation in altitude is read by the compound microscope at I, which is nine inches long, and which, by means of its micrometrical screw, reads the divisions of the semi-circle to the accuracy of 5", when an allowance of 12" is made for excentricity. When this theodolite was first brought into use, it was found that the screw L, with an ivory thumb-piece, moved the circle in azimuth by jerks, on which account the apparatus for slow motion, seen in *fig. 2*, was substituted, in which two crown-wheels and a Hooke's joint are introduced to give motion to the tangent-screw; which addition not only remedied the jerks, but allowed the observer to reach the handle while his eye remained at the upper telescope. The large brass horizontal circle is divided into quarters of a degree, and the subdivisions are made by the vertical micrometrical microscopes, the divided heads of which read exact seconds, when properly adjusted for zero,

for

for distinct vision, and for power. The screw of the vertical micrometers has seventy-two threads in the inch, and the notches that indicate the fifteen minutes on the micrometrical scale of steel, are formed by this screw, which we mention particularly, because this mode of reading was probably an original mode, though now become common. These vertical microscopes, G and H, have each a stage, represented by *Plate IX. fig. 4*; and a dot made on a thin slip of gold, called a *gold tongue*, lies under the object-lens in such a situation, that the capstan screws can adjust it to a given place in the field of view of each microscope, so as to become a *mark* for making the adjustments by, and for bisecting the circle at reversed opposite readings. The position of the three glasses of each microscope is seen in *fig. 3.* of the same plate, together with the magnified appearance of the notched scale and divisions of the circle. In *fig. 5.* the general plan of the micrometer is exhibited, and in *fig. 6.* is the plan of the stage where the pillars enter, that support the microscope. *Fig. 7.* shews the lower or steel slide, and *fig. 8.* the upper or brass slide, that separate the wires of the micrometer; while *fig. 9.* is a representation of the long horizontal microscope that reads the divisions of the semi-circle above noticed, at the letter I in the large figure of *Plate VIII.* As it was not easy to describe the construction of the three feet, two of which, we have said, only are visible, opposite to D and E, we have added *figs. 3. and 5.* in *Plate VIII.* to illustrate their position. In *fig. 3.* the piece F F, as before, is a portion of the stand, and D E a portion of the octagonal board, to which the screw F is attached, that presses against the angular corner of the stand, into which a piece of brass is let for the screw to press against, an end section of which is shewn in *fig. 5.* with the same letters of reference to the same parts: M N is a section of the base of the instrument, and O one of the three brass branches that bears the foot-screw P, and its two side screws or tightening screws Q, R, as seen in *fig. 5.* At S is a curved piece of box, fast to M N, which bears the principal part of the weight laid on this screw, and does not gall the parts on which it slides, when a circular motion is given; but, to take off a part of the weight, a cylindrical roller near S is put to a horizontal spring bearing the central pin of the roller, which spring presses the roller even with the face of the curved block of box, and may be made to take more or less of the weight by a screw pressing upon it from above, and giving it more or less tension. Hence all the parts of this large instrument are strong, and yet the moving parts are made to go freely and smoothly; and the only alteration that can apparently be made for the better, is the addition of a third vertical microscope, for which the construction is peculiarly adapted; for each branch of the triple bar that carries the three feet, being braced firmly, is made as though each was intended to have a microscope over it, which is the case with only one; and an additional foundation for the second stage is made to receive the second microscope, as we think, unnecessarily; for if three equidistant microscopes had been used instead of two opposite ones, not only would the errors of division and of eccentricity have been lessened thereby, but in the reversed position new parts of the circle would have been pointed to, equidistant from the former three, so that six portions of the circle would thus have been employed in measuring a reversed observation, which the present astronomer royal first pointed out to be an advantage peculiar to three readings on a horizontal circle. We have been informed, that it is yet intended to have three microscopes attached to the horizontal circle of this large instrument, to be used as we have here suggested. For the

advantage of a triple reading, see our table for three verniers in the article CIRCLE.

After having given a description of Ramsden's great theodolite, we proceed, in the next place, to explain how its different adjustments are made, for putting it into a state proper for use, which we cannot do better, than by adopting the directions laid down by general Roy himself.

*The Adjustment of the Axis Level.*—The axis of the upper or transit telescope, being brought over any one of the feet, and the circle being clamped, hang the axis level on the pivots, or axes of the telescope, and bring the bubble to the two indices; then reverse the level, that is, turn it end for end, and note the difference. Bisect this difference, one half by the level's adjusting screw, and the other half by that foot-screw only which is in a line with the axis. This operation being repeated until the difference wholly vanishes, the level will be truly adjusted, that is to say, the bubble will rest between the same points in both positions.

*Adjustment of the Elevation Level.*—This level being suspended on the rod attached to the outside of the transit telescope, screw the erect eye-tube on, to make that end preponderate. Adjust the bubble to the indices by the steel finger-screw at the tail of the semi-circle's clamp, reverse the level, and note the difference. Then bisect that difference, and correct one half by the finger-screw, and the other half by the proper adjusting screw under the level, and so on, repeatedly, until the difference wholly vanishes. The level may then be hung on the two pins that project from the horizontal bar which carries the telescope, where, being parallel to the axis level, it will shew, when that is removed (as is commonly the case when terrestrial objects only are observed) whether the plane of the instrument suffers any alteration. If this should have happened, the level on the horizontal bar is at all times sufficient to correct it.

*To set the vertical Axis perpendicular.*—This may be done by either level, but best with the axis level, which, being suspended on its pivots, must be brought parallel with two of the feet of the instrument; and by the screws of these two feet, the bubble is to be brought between its indices. The circle being then turned round  $180^\circ$ , if the bubble changes its place, half the difference is to be corrected by one of the feet-screws, and the other half by two capstan-headed screws, that act against each other, under and belonging to one of the Y's, or supports, in which the pivots rest. When the bubble is found to be just in these two positions, turn the circle  $90^\circ$ , which will necessarily bring the axis over the third foot of this instrument: then correct any error there may be by that foot-screw. In this manner the circle will be made to revolve again and again, without any alteration whatever of the bubble, which shews that the vertical axis is then truly perpendicular to the horizon.

*To make the Line of Collimation in the Telescope at right angles with the transverse Axis.*—The pivots resting in their Y's, direct the telescope to some distant well-defined object, and let the circle be clamped. Then reverse the axis, that is, turn the telescope upside down. If the intersection of the wires does not coincide with the object in both positions, half the difference must be corrected by the motion of the circle with the Hooke's joint, and the other half by the motion of the brass slide in the eye-end of the telescope, by applying the milled-head key in the small socket seen in the figure; and so repeatedly until the difference wholly disappears.

*To set the Rod on which the Elevation Level hangs parallel to the Line of Collimation.*—The vertical axis being supposed to be

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be nearly vertical, hang the level on its rod, and rectify the bubble by the finger-screw of the clamp. Set the horizontal wire on the steel slide, to intersect the centre of the oblique wires, and place the dart or index at zero on the micrometer head. Then observe some distant distinct object covered by the horizontal wire. Invert the semi-circle, that is, turn the azimuth circle  $180^\circ$ , and the telescope upside down, so as to bring the wire upon, or nearly upon, the same object. Now, if the level be not right, rectify it by the finger-screw at the tail of the clamp. If the telescope does not now accurately cover the same object, as in the former position, bisect the difference by the finger-screw of the clamp, and then rectify the bubble by the capstan-nuts under one end of the rod. Repeat this operation until the level is right, when the telescope sees the same object in both positions, and thereby the rod will be brought parallel in altitude to the line of collimation, or axis of vision.

We have described other and more recent constructions of large circular instruments, under the word *CIRCLE*, that have all the properties of the theodolite which we have here described, and some of which have the advantage of a large vertical circle, that renders their use in astronomy co-extensive with their application to geodetical operations, and which therefore we recommend in preference to the bulky instrument with which the English trigonometrical surveys were performed.

A theodolite of a portable size, and of Troughton's best construction, is exhibited in *Plate IX. fig. 1. of Surveying*, such as is adapted for land-surveying, or for the surveying of harbours. A, B, C, are the three mahogany legs of a tripod, surmounted with brass joints which allow the legs to form one entire cylinder, about four feet long. The brass-work above the three joints has a male screw, upon which a socket, under the brass circular plate D E, screws, and bears the instrument, which is almost entirely of brass. This plate D E has four sockets made fast into it, projecting both above and below, as seen in the figure, in which are exhibited three out of the four, with as many screws with milled heads, that ascend and descend as they are turned round, forwards or backwards, by means of their connection with their respective sockets, that have each a female screw: the heads of those screws press against the inferior face of the upper circular brass plate F G, to which a ball, ending with a vertical axis, is attached, and is embraced by the upper portion of the socket of plate D E, within the four screws. The intention of the ball and socket, and of the two plates with the four intervening screws, is to place the axis of the ball in a vertical position, and to keep it in that position while the parts above are employed in making an observation; which office this mechanism will perform on sloping as well on level ground. The axis of the ball, however, is made hollow, to admit of a smaller solid axis within it, and has also two sockets or tubes surrounding it; all which have separate motions, when the ball is made fast by the pressure of the four screws. The inner tube is attached to the graduated circle L M, of eight inches diameter, the chamfered edge of which circle is solid silver, that receives the dividing strokes read by the microscope K: and the clamping piece, seen separately in *fig. 2*, will fix the said tube and graduated plate in any given situation by means of the screw F, after which the screw G with the milled head, attached to the plate F G, will produce the slow motion when necessary. The lower telescope H I turns on two pivots not seen, one of which pivots has its hole in a cock, borne by a smaller circular plate under the graduated plate, into which the two screws H and I

enter, and the other pivot enters the outermost tube; so that an elevation or depression of about  $20^\circ$  can be effected by this telescope, before its motion is limited by the superior and inferior plates. This telescope has a proper motion in azimuth, independently of the graduated plate, which motion is produced by the thumb-screw H, the axis of which has a pinion acting with a concealed wheel made fast to the graduated plate; but when the clamping-screw I is made fast, then the telescope and graduated plate have but one common motion, which is commanded by the tangent-screw G of the clamping-piece F G. The use of the separate motion of this telescope will be explained presently. Above the graduated plate L M, and in close contact with it, the vernier-plate revolves with the solid or innermost axis, that is fast to it, and its clamp and screw of slow motion are hid from the sight by the superincumbent frame. This plate, which has four opposite verniers, each reading to the accuracy of  $15''$ , will move separately, or may be clamped to the graduated plate, as occasion may require. Upon the plane of this vernier-plate, two spirit-levels are placed with their proper adjusting-screws, one of which is seen at N; but the other, which stands at right angles to this, is concealed in the drawing by the frame-work. A compass and magnetic needle are also concealed within the frame, but may be conceived to be concentric with the vernier-plate within the said frame. The tail-piece of the revolving microscope K fits into a circular groove under the graduated plate L M, and, without having a centre of motion, will slide along the groove into any of the four positions, where the verniers require to be read, without interfering with any of the other motions. The instrument now before us has been some years in use, and is drawn on an enlarged scale, that all the parts may be the better described; but the most recent theodolites of this construction have only three verniers, in preference to four, by reason of the property, which this number has, of measuring at  $\sqrt{2}$  different and equidistant points on the graduated limb, when the measurement of an angle is repeated in a reversed position of the superior telescope; so that whatever errors of excentricity or of graduation may exist in the horizontal circle, they will be made to vanish, in a great measure, by their counteraction in the reversed position of the verniers. Upon the plane of the vernier-plate is screwed, by three screws, forming an isosceles triangle, the frame which supports the pivots of the horizontal axis of the semi-circle P Q, on which the upper telescope T U is placed. The arm, which bears the microscope O for reading the altitude or depression measured by the semi-circle, has a tube that slides upon the projecting horizontal axis, that allows of some degrees of motion between the end-bars of the frame; and another arm, that clamps the opposite end of the said axis, has a tangent-screw of slow motion at R, which finishes the final contact of the intersecting point of the spider's lines, within the eye-end of the telescope, with the object viewed. The vernier for the semi-circle is screwed to the frame, after spanning over the compass-box; and its exact place may be adjusted by the screw of the frame above M, which stands at the apex of the isosceles triangle formed by the three screws. The level, that is seen under and parallel to the upper telescope, is attached to it by two pairs of screws, one pair of which adjusts for the elevation or depression of one end of the tube that holds the bubble, and the other pair adjusts laterally for true parallelism in this respect: when the pins T and U are removed, the upper semi-circle of each ring, V and W, will turn back each on a hinge, and allow the telescope to be taken out of its Y's, for the purpose of being reversed in

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position; and in both situations the telescope is capable of having a circular motion, that carries the attached level round with it an entire revolution. During this revolution, an eye observing the intersected point of the field of view, as projected on a distant point, will see whether or not any adjustment of the spider's lines is necessary, and in what respect. The aperture of each telescope is an inch and a half, and the ordinary magnifying powers are from ten to eleven, with nearly fourteen inches of tube; but the upper or measuring telescope has a second eye-piece of the positive kind, which produces a magnifying power of twenty times. There are three spider's lines in each eye-piece, one horizontal, and two crossing it so as to include a small angle between them; which method of fixing the lines, allows the observer an opportunity of bisecting the said small angle by a vertical staff erected at a distance, which is better than covering the staff with a vertical line, that would disappear upon the plane of such staff. Before we proceed to explain how this theodolite is used in the field, it will be requisite to shew how the previous adjustments are to be performed.

When the instrument is screwed to the head of the tripod, the legs must be opened wide enough to ensure a firm position, and the points must be pressed into the ground equally, exactly over the hole into which a station staff has been, or is intended to be, inserted; so that the plumb, suspended from a pin at the junction of the legs, will fall exactly upon the said hole; in which situation the *station*, marked  $\odot$ , is said to be taken.

When the theodolite has been properly fixed in its station, the first adjustment that will require to be made, is that which regards the *line of collimation*. When all the parts of the instrument are properly in their places, let the upper telescope be pointed in a horizontal line, that passes over two of the four screws of plate D E, and note what point in a distant object is covered by the horizontal spider's line, near the middle of the field of view; then turn the telescope half round in the Y's, till the level lies above it, and observe if the same point is again cut by the said line; if not, elevate or lower the horizontal line by the proper screws in the eye-piece, releasing one and screwing up the other, till the distance between the two points, corresponding to the two positions, is bisected by the horizontal spider's line: and if, when the telescope is turned back to its original position, with the level under it, the spider's line covers the point adjusted to, the line of collimation in altitude or depression will be correct; but if not, the operation must be repeated delicately, till the horizontal line covers the same distant point in both positions. The same operation will also put the vertical line correct, or rather the point of intersection, when there are two oblique lines instead of a vertical line, as in Troughton's theodolite; and the adjustments will be known to be complete, when the point of intersection continues on the same distant point, while the telescope is made to revolve round the line of collimation as an axis.

The second adjustment is that which puts the long *level* parallel to the rectified line of collimation. While the telescope remains parallel to the line that joins two opposite screws of plate D E, adjust those two screws by turning them in opposite directions, until the bubble is observed to be in the middle of its tube under the telescope: then, the semi-rings V and W being previously turned back, reverse the ends of the telescope, and also of the level attached to it; and if the bubble will resume its former situation in the middle of the tube, both the line of collimation and the level will be truly horizontal, and consequently parallel to each other; but if the bubble recedes to one end, bring it back one half by the screws that elevate or depress one end of the level, and the

other half by the screws of plate D E. Let this operation be repeated till the bubble will remain in the middle of the tube, after the telescope has been reversed into both positions. The adjustment of the level, however, is not yet complete; for though the axes of the two tubes may be equidistant at both ends of the level, yet may they be inclined so as to form an horizontal angle with each other at some distance; and in this case the bubble will run to the higher end of its tube, when the telescope rotates; there are therefore two lateral screws, which adjust the parallelism of the two tubes, so that the bubble will remain in the middle, in every part of a rotation of the telescope round its line of collimation, which adjustment must now be made; and if this lateral adjustment should be found to derange the vertical one before made, it must be re-adjusted, and the level will then be in a proper state for use, provided the Y's are alike, and also the cylinders that rest in them; but if not, the bubble will not rest in the middle in both of the reversed positions, till they are made so.

The third adjustment that we propose to explain, is that which puts the line of collimation exactly at right angles to the axis of the semi-circle's vertical motion, which has not yet been described, but which is essentially necessary to be attended to, more particularly by the maker. Let the upper telescope be directed to some horizontal well-defined mark, that is included within the angular space formed by the two oblique lines, just where the vertical line would have been, if such line had been used, while zero of the vernier coincides with zero ( $360^\circ$ ) of the horizontal limb of plate L M; then all the screws being fast, except the one which allows the vernier-plate to revolve, turn  $180^\circ$  in azimuth, and reverse the telescope by taking it out of its Y's, into its original position with respect to the mark; and if this is seen in precisely the same situation in the angular space, (though not perhaps with respect to altitude, if the axis of the vernier-plate was not previously adjusted,) the line of collimation will be at right angles to the axis of the vertical motion; but should this not prove to be the case, one of the Y's will require to be altered laterally, but the adjustment of the level will not be deranged thereby. This alteration of one of the Y's had, however, better be effected by a regular workman, and should never be neglected by the maker.

The fourth adjustment, which might have preceded the third without inconvenience, is that which makes the common *axis* of motion of the vernier-plate and horizontal graduated circle truly *vertical*. This is done partly by the screws that fix the ball and socket, inserted into plate D E, and partly by the adjusting-screw R of the vertical semi-circle. Hitherto the upper telescope has lain over two of the four screws only, and in a horizontal line, with the bubble in the middle. Let it now be turned along with the vernier-plate just  $90^\circ$ , till it lies over the other pair of opposite screws, and see if the bubble be now also in the middle, if not, make it so by those screws; and if, after this operation, the bubble will remain in the middle during a whole revolution of the vernier-plate, in both the reversed positions of the telescope, the vertical axis of motion will be truly adjusted.

The fifth adjustment relates to the levels fixed to the plane of the horizontal graduated circle, which are useful in watching the horizontal position of the instrument, while an observation is making; these, which are at right angles to each other horizontally, must also be separately at right angles to the vertical axis that carries them round. When this axis has been adjusted, as we have just explained, by the level of the upper telescope, the bubbles of both

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the fixed levels must be brought to the middle of their respective tubes by their proper screws, so that the bubbles of all the three levels may remain stationary in every part of the revolution of the vernier-plate, which they will do if its axis is truly vertical.

The sixth adjustment is that which puts the axis of the semi-circle's motion truly horizontal, or at right angles to the vertical axis of the horizontal circles: this is known to be so, when the point of intersection of the spider's lines will cover a long plumb-line, suspended at a distance, as the angle of elevation increases, from the inferior to the superior end of the suspended line; and still better by trying if the pole star, and its reflected image, seen in a basin of quick-silver, will be successively covered by the said point of intersection of the spider's lines. In some theodolites, the horizontal axis lies in adjustable Y's, like those of a transit-instrument; but in the instrument before us, the adjustment was made permanent by the maker.

Lastly, the adjustment of the vernier to zero of the semi-circle is made by the screw near M, which elevates or depresses the whole frame in which the telescope and semi-circle move, and consequently alters the situation of the level, which has its bubble brought back again by the screw R, that gives slow motion to the semi-circle, when the clamp at the superior end of the arm is made fast to the axis of motion; but it is not essential that zero of the vernier should be at zero of the semi-circle when the level is right, because when an altitude or depression is repeated in the reversed positions of the telescope, the two readings will have equal and opposite errors; and one half of the difference of those readings will be the constant index error, which may be ascertained with great precision from an average of a number of reversed observations.

The lower telescope, being placed as a guard to watch any azimuthal alteration in the position of the instrument, requires no adjustments, except that for distinct vision, after it is brought to its object by its proper vertical and horizontal motions, in which situation its horizontal motion is clamped by the screw I under the horizontal plate.

After the adjustments are all made, or examined, the theodolite may be used for measuring either horizontal or vertical angles in the following manner. Let us suppose two staves erected vertically on level ground, one towards the east and the other towards the south of the station where the instrument stands in a state of adjustment; and let it be required to ascertain the angle subtended at the centre of the instrument by a line joining these staves: in the first place, the lozenge of the vernier No. 1. must be clamped to 360° on the horizontal circle, and the clamping screw F must be released, so that the upper telescope, vernier-plate, and graduated horizontal circle, may all move in azimuth together, till the staff to the east is seen in the field of view; this clamp F may then also be made fast, and the screw of slow motion, G, will bring the staff to bisect the angle formed by the spider's lines, in which situation zero of the measuring circle is truly placed: in the next place, bring the lower telescope, by its proper screw H, into precisely the same situation, and fix it there by the fixing screw I: then, having examined that the upper telescope has not moved from the staff by any accident, release the clamping screw that held the vernier-plate, and turn the upper telescope, till the second staff in the south bisects the angle of the spider's hairs; which may first be done roughly before clamping, and afterwards more exactly, by the tangent-screw of the clamp; then, having examined the position of the lower telescope again, let all the four (or three) readings of the vernier-plate be put down, and take the fourth (or third) part of their amount as the true angle, and see that

both telescopes have their staves bisecting their respective angular spaces as at first, after the measures are read, and then the average thus ascertained will be nearly the true angle: but to prove the exactness of the measure thus taken, and also the accurate construction of the instrument, the telescope resting in the Y's may now have its position reversed, and then No. 3. of the four verniers must be clamped to the point 360° of the graduated circle, and the same operation must be repeated, when another average of four measures will be had, and an average of these two results with opposite index errors, may be considered as very near the truth; and more particularly if there are only three verniers; for then, as we have stated above, the readings will be at six equidistant points of the circle, and will correct for eccentricity as well as inequality of divisions, if any exist. In ordinary measurements of angles, in small surveys of land, this attention to extreme accuracy may be superfluous, where the instrument is well centered and graduated: but where the lines to be measured are long, the angles cannot be taken with too much care; particularly when any side of a triangle is to be determined, or checked, by the opposite angle.

In taking an angle of altitude or of depression with the semi-circle of the theodolite in question, very great accuracy is not to be expected, seeing there is but one vernier; but by proper attention to the previous adjustment of the level of the upper telescope, and by using the telescope in the reversed positions, two measures will be obtained with opposite errors, that counteract each other's effects, so as to render the measure true to 15". It is hardly necessary to add, that the measure of a vertical angle is taken by the horizontal spider's line, and that the lower telescope is of no use in taking such measure.

We proceed, lastly, to exemplify the use of a common theodolite by an actual survey of a small estate, such as will come within the limits of one of our plates, and by an explanation of the manner in which a *field-book* is kept in practice, and its contents transferred to the formation of a map, agreeably to the most approved methods of measuring and plotting an estate of any assigned dimensions. For this part of our article we are indebted to Mr. James Wadmore, whose experience and acknowledged skill, in his profession of land-surveyor, eminently qualify him for communicating the requisite information which we have reserved for this place, to render the subject of *surveying* complete.

"Preparatory to making a survey with the assistance of a theodolite, I consider it indispensably necessary, (says Mr. Wadmore,) that the surveyor should feel well assured that his instrument is in a perfect state of adjustment, and also that his chain is correct, otherwise no dependance can be placed upon the most particular and minute field-book he could make; for if these primary things are not attended to, the result of his labours, on plotting his dimensions, will turn out to be only so much time lost, as well as that which he may have bestowed upon his survey.

"In order to obviate these difficulties in some measure, I most earnestly recommend to the young practitioner, that, in choosing his theodolite, as well as his protractor, case of instruments, plotting scales, &c. on which every thing depends to enable him to complete his surveys with correctness, that he be not sparing of a little money in purchasing those that are good, and can be relied upon for accuracy; as the being furnished with such, in the first instance, will be the means of ensuring to him that ultimate dispatch in the progress of his profession, which will lead him to the most satisfactory results.

"As nearly the whole of the profession of surveyors have some material or nice distinctions in keeping their field-

# THEODOLITE.

books, arising either from the peculiar methods they have been taught, the instruments they use, the methods the more experienced have been led to adopt; from the more enlarged and enlightened views they may have taken to ascertain the best possible manner of facilitating the desired object, that of making a correct survey; or from the more improved state of mathematical science; I trust I may be permitted to offer the following method of taking dimensions, the form of keeping a field-book, and the method to be adopted in plotting the same. Having made use of the theodolite, and endeavoured, by practical experience, to avail myself of its most beneficial services, I have no doubt but the specimen I now submit will be most readily comprehended, and the most intricate and difficult surveys accomplished by the same means; *viz.* with the assistance of the theodolite, where other methods, by possibility, may be found partially (if not wholly) to fail.

“On commencing a survey, I have always found it necessary to look out for an intelligent labourer, well acquainted with the locality of the neighbourhood, with whose assistance, and another to carry the theodolite, I usually commence; invariably taking the chain myself after the leader: and here it may not be amiss to remind the young practitioner, that, in following, he must be most particular in directing his chain-leader in a straight line, otherwise the relative bearings of the stations forward, taken by the theodolite, will be rendered incorrect, and the protractor in plotting will not fail to convince him of his error, to his great chagrin and disappointment. I must also remind him of the necessity of keeping his chain-hand, and also directing that of his chain-leader to be kept as near the surface as conveniently can be done, and the chain properly stretched, by which means he will obtain more correct lengths in measuring from station to station, insuring thereby the greater accuracy in his survey (particularly if it be large); as he will very early find, in the course of his practice, that errors, when once begun, will rapidly increase; to prevent which, it will be found very convenient to plot every day's work on his return home, before he commences another, when, if any error is found, it can be rectified on the following day.

“Many other necessary cautions might be given to the young surveyor, which by some may be thought superfluous, but the following I cannot help recommending to his attention; *viz.* that of being exceedingly particular in marking and describing his exterior boundaries, having myself, more than once, seen litigation prevented by the production of correct surveys, where the boundaries of estates in dispute were clearly defined. And let him not be fearful of taking too many offsets, or dimensions; for by trusting observations necessary to his survey to memory, he cannot but fail to omit some; whereas by a copious field-book, not even the slightest bend in a fence, or object of any sort, can possibly be omitted. Above all, let him feel well satisfied of the correctness of his chain; to enable him to do which, he should always have a spare one, on a large survey, to correct by; as it is well known that accidents will happen by the breaking of the same, by loss of rings, &c.; and the offset staff, from being too short, cannot be depended upon for this purpose.

“Having said thus much, I now proceed to shew the method I have practised in surveying with the theodolite; in doing which, I shall first premise that I have always considered it advantageous to take a view of the estate to be surveyed, by doing which, I have been enabled to avail myself of studying the best stations, and to judge how the business may be accomplished with the greatest facility.

“The theodolite which I have been accustomed to use

is a very good one, made by Cary, about five inches diameter on the limb, which is finely graduated, with a vernier reading minutes, and with degrees numbered from 1 to 360; it has an achromatic telescope and vertical arc, for the purpose of ascertaining the angles of elevation and depression in hilly surveys, on one side, and the corresponding deductions to be made in the chain lines on the other, and moves by rack-work.

“The method adopted by me, after some years' practice, in keeping a field-book, perhaps may be thought singular, namely, that of commencing at the bottom of the last page of the same, and working upwards therefrom; but it will readily be seen, on reference to the accompanying field-book in *Plate X.* to be the best way, as in proceeding, you meet the objects you have to describe in succession as you advance, and it affords a much greater facility in laying off the offsets from the chain-lines, than in the other way.

“It is well known that the needle is frequently affected, in the first place, by the atmosphere, and liable to get out of order; in the second, the chain being made of iron as well as the arrows, and their not being moved a sufficient distance in general, when the theodolite is planted for taking an angle, it may thereby be very materially affected; in the third, articles of iron or steel may be about the persons attending the survey, which may have the same effect; in the fourth, it may not be found improbable, from the very nature of the ground on which a survey may be carried on, that veins of iron, or metallic ore, may exist under the surface, which will not fail to influence the polarity, to the utter detriment of ascertaining the true bearings; and, lastly, without a vernier, the angle cannot be read with sufficient accuracy.

“Trusting that the foregoing remarks will suffice to convince those, who may be carrying on surveys by the needle alone, of the danger of trusting to this method, as well as to prevent the student in the profession from so doing, I now proceed to shew, that by taking the included angles of the survey upon the limb of the theodolite, and by carefully noting them in the field sketch, (as seen in the plate,) no such danger can possibly exist. The following problem will give sufficient proof of the accuracy of this method of measuring the internal angles of any geometrical figure, whatever may be the number of its sides; *viz.* double the number of sides, and multiply them by 90°; and then, if 360° be subtracted from the product, the remainder will be the sum of all the internal angles; for if we suppose lines drawn from every angle to one common point in or near the middle of the figure, there will be as many triangles as there are sides, and the sum of all the angles at the apex, or point assumed, will be 360°, as will appear when circumscribed by a small circle: therefore, as every triangle contains 180°, the amount of all the triangles will be as many times 180° (or 90° × 2) as there are sides, when diminished by 360°. In our example, the survey is bounded by five chain lines, with as many included angles, and therefore the amount of the angles will be  $5 \times 90^\circ \times 2 - 360^\circ$ ; or  $900^\circ - 360^\circ = 540^\circ$ , agreeably to the subjoined measurements taken in the field; *viz.*

At	⊙	2	-	-	85° 14'
	⊙	4	-	-	88 18
	⊙	6	-	-	{ 60 4 }
					{ + 74 20 }
	⊙	10	-	-	{ 73 36 }
					{ + 71 16 }
	⊙	1	-	-	87 12
					-----
		Total sum	-	-	540 0
					-----

Having

Having said so much relative to the means of applying the theodolite most beneficially, I shall now explain an example of each of the methods I have alluded to; in doing which, I beg it may be understood, that although the difficulties I have enumerated may in some cases exist, yet it is possible a survey of moderate extent may be carried on by the needle with caution sufficient to obviate them; though I am fully satisfied, from experience, that the latter method is the most to be relied upon; I shall, however, proceed to exemplify both in the order before-mentioned.

*"The Method of using the Theodolite in ascertaining the Bearings by the Needle.*—It will be seen by the field-book, that I commence at (station)  $\odot 1$ , at the back of the mansion: here, having the theodolite firmly fixed in the ground, by means of the four adjusting-screws, I set it perfectly level, first in the direction of the magnetic north, and afterwards at right angles: being thus satisfied, I set the vernier on the upper limb correctly to  $360^\circ$  on the graduated circle, and loosen the screw that fixes the instrument. I then move the graduated circle round until I ascertain that the needle points to N. in the compass-box, and then tighten the same screw, which prevents it from moving. Being now ready to take the bearing from  $\odot 1$  to  $\odot 2$ , I direct the telescope to some object in that direction, keeping as near to the boundary-fence as can well be admitted, in order to reduce the length of the offsets; and having brought the cross-wires in the telescope to bear upon the object, I then look to see what part of the limb is cut by the vernier, which I find to be  $330^\circ 2'$ , and in a north-west direction. This I note down as in the field-book, and afterwards examine whether it is correct. I then direct the chain-man to move forward towards that object, leaving a mark behind, to return to, and proceed by first taking the following offset at 00; that is, at the place of commencement, I find an offset to the right of 86 links to lady Buckinghamshire's fence, and 40 from thence back to the building, which I note down. I then proceed, and at 212, I measure 5 links to the right, to a tree; and going forwards at 274, I measure 2 links to the left, to another tree, (which objects I am always induced to mark in the survey, for the purpose of embellishing the fair map): proceeding onwards at 310, the offset to the corner of lady Buckinghamshire's summer-house is 10; at 360, the chain touches the fence, consequently I mark the offset 0 (nothing); at 738, there is an offset to the left of 23 links, to a tree; and at 917, one to the fence of 13: continuing the line, I set up a mark at 950, and write the same down in the

field-book, thus " $\odot 950$   $\odot 3$  mark left," meaning it for

a station, to join to hereafter: I call it station  $\odot 3$ , being

the next number following the station I am measuring towards; and I inclose it in a circle, to make it more prominent to refer to; and mark the 950, the number of links on the chain-line, also in a circle, that I may not err in plotting off the situation of the same. I then go on, and at 960 come to the outer edge of a small clump of trees; at 975, an offset to the left ascertains the width of the clump that way to be 50 links, and one to the right of 13 links to the fence; 986 passes the outer edge of the clump; at 1031, an offset of 31 links on the left to the canal; at 1100, passing close to the edge of the canal, there being no offset on the left, I mark it 0 (nothing); at 1155, I cross the gravel-walk, the width of which was previously noted in the field-book to be 8 links; and at 1180, I halt, and mark the offset to the fence on the right 5 links. Here I again plant my theodolite, as before,

exactly over the station-hole; and after setting it perfectly level, and having brought the vernier  $360^\circ$  on the circle, and ascertained that the needle was correctly pointing to N. in the compass-box, I tighten the fixing screw, then move the telescope round gently to the left, until the cross-wires cut a conspicuous object in the direction in which I mean to proceed, and ascertain that the vernier cuts  $235^\circ 7'$  in a south-west direction in the box. This I note down immediately in the field-book, as there represented; and after examining that I had done so correctly, I proceed on to measure the line from  $\odot 2$  to  $\odot 4$ , taking the offsets right and left, and making the necessary remarks, to enable me to give a correct map and description of the estate, and so on throughout the survey. I have been particular in the field-book, which I trust, by the above description, will be considered to be a plain and facile way.

*"The Method of using the Theodolite in ascertaining the Angles upon the graduated Circle, without Reference to the Needle.*

—On commencing, I plant the theodolite firmly in the ground, and after adjusting the level perfectly, and setting the vernier to  $360^\circ$  on the limb, I move the circle round, until I ascertain that the needle in the compass-box points correctly to N.; then tightening the screw that fixes the instrument, as before, I move the telescope gently round in the direction of the line to  $\odot 2$ , in doing which, I find that the vernier cuts upon  $330^\circ 2'$  N.W. This is noted down, in order to shew the bearing of the estate upon the map, and which, on being deducted from  $360^\circ$ , leaves an angle to the left of the meridian of  $29^\circ 58'$ , as shewn in the example: then leaving a mark at station  $\odot 1$ , and having proceeded along the line to station  $\odot 2$ , and taken the offsets, and made the necessary remarks in the field-book, as in the former method, on arriving at  $\odot 2$ , I again plant the theodolite firmly in the ground, and adjusting it as before, move the telescope round until the cross-wires cut the lower part of the mark left at  $\odot 1$ : then noting in my field sketch the number of degrees cut by the vernier upon the limb, without regarding zero, I afterwards move the telescope carefully round to the right, and direct it towards  $\odot 4$ ; and bringing the cross-wires in the telescope to cut the object proposed to be measured to, I look and see the number of degrees cut by the vernier on the limb, as before: deducting one from the other, I get the  $\angle$  at  $\odot 2$ , viz.  $85^\circ 14'$ ; and after having measured the line, on my arriving at  $\odot 4$ , I proceed exactly in a similar way, by first looking back to the last station, and then forward to the next, deducting the number of degrees and minutes in one direction from those read in the other, which gives the angle  $88^\circ 18'$ . Following this course, I proceed on the survey until all the angles and sides are completed.

It is necessary, however, before quitting each station, to take particular care in reading off the angles by the vernier, and also in writing them down correctly: and in this way of proceeding, the trouble of adjusting for zero of the vernier to  $360^\circ$  at every station is avoided.

By plotting, is understood the making of a draught of the estate from the field-book; and as the instruments necessary to be used by the surveyor, in taking the dimensions in the field, are such, that he may be enabled to ascertain distances and angles correctly; it naturally occurs that corresponding requisites are necessary to make a ground-plot, or draught thereof, for laying down the quantities of the several angles, and of the distances measured by the chain upon paper, which are usually accomplished by means of the protractor for the former, and scales of equal parts for the latter.

With respect to the protractor, I have hitherto used, and recommended the young surveyor to use, one of eight inches

inches diameter, graduated to half a degree, and numbered from 1 to 360°, to correspond with my theodolite, with a vernier to mark off the angles to one minute of a degree, and a projecting pointer of two inches and a half beyond the outer radius of it, which in general surveying will be found, with care, to be sufficiently correct. This I had also from Mr. Cary of the Strand, together with the set of ivory plotting-scales, of about twelve inches long, decimally divided the whole length close by the edges, which are chamfered, to lay close to the paper, and give additional facility in pricking off the chain-lines, numbered 1, 2, 3, 4, &c. which are chains: these again are subdivided into tenths, every one of which divisions are reckoned 10 links. The numbers are so placed as to reckon backwards and forwards for convenience; but the method of using them is now so universally known, and so easily understood, as to preclude the necessity of any further description. I shall, therefore, proceed directly to state the method used by me of transferring the dimensions of the estate from the field-book, which is as follows; viz.

“ Having provided myself with a sheet of drawing-paper of sufficient size, I proceed to draw a line across the same in pencil, which line is nominally representative of the magnetic meridian, or that which the needle in the compass box points to. On a convenient situation on this line, with a fine pointer, I make a mark thus ⊙, and calling that (station) ⊙ 1, I lay the protractor with its centre upon the station-point, and take care that 360° of the protractor cuts the line on the northern side, and 180° the southern side of the meridional line: I then turn the moveable pointer to the left, until the centre of the vernier thereof cuts 330° 2' on the limb of the protractor, when I press down the pointer sufficiently hard to make a visible mark; then taking off the protractor, I draw a fine line with a pencil from ⊙ 1 to the point so pricked off; and afterwards, with a scale of chains, mark off the length of the first chain-line, viz. 1180 links: I also mark off 950 links for ⊙ 3, where a mark was left to join to. This done, I draw a line parallel to the first magnetic meridional line through ⊙ 2; when I put the protractor upon the same, taking care that the centre is exactly upon ⊙ 2, and that 360° and 180° exactly cut the meridional line north and south respectively; which being done, I move the pointer to the left; and when I find the vernier cuts 235° 7' on the limb, I again press down the pointer, and make a sufficient impression on the paper, to which I draw a line from ⊙ 2: then taking the scale, I prick off the length of the chain-line from ⊙ 2 to ⊙ 4, being 1274 links, and also 994 links on the same line from ⊙ 2 to a mark left there, and called in the field-book ⊙ 5. I proceed in this manner until the whole of the bearings and chain-lines are laid down, the last of which, or the connecting-line, viz. from ⊙ 10 to ⊙ 1, on being laid down, and the protractor having pricked off the angle 62° 41' N.E., I draw the pencil-line, and finding that it closes upon ⊙ 1, both as to bearing and distance, I am satisfied the whole is correct.

“ In laying down the angles and chain-lines of the survey taken by the latter method, without the use of the needle, little need be said; for, having first drawn the magnetic meridional line, marked N. S., a mark is made on some convenient part thereof for ⊙ 1; then laying the centre of the protractor thereon, and 360° and 180° thereof cutting the meridional line north and south respectively, I prick off 29° 58' on the left-hand, or north-west side, as being the relative bearing of ⊙ 2 from ⊙ 1; then drawing a fine line, I mark off the length of the chain-line, and lay the centre of the protractor upon ⊙ 2, and mark off the ∠ between ⊙ 1, which I first look back to, and ⊙ 4, the angle of

which, on deducting the quantity of one from that of the other, I find to be 85° 14': this I prick off, and drawing a line thereto, I mark off the length of the chain-line 1274 links, and so continue to proceed until the boundary is finished. I then proceed to mark off the offsets at their proper points in each chain-line, and connecting the points of such offsets, I have the boundary defined of its true shape and dimensions, as seen in the map. Lastly, I cast up the dimensions of the several triangles and offsets, considered as small trapezia, the method of doing which has been explained under the word CHAIN, and find the contents as expressed in the subjoined table.

*Freehold in Hand.*

	A.	R.	P.
A. Mansion, out-buildings, shrub-beries, lawn, canal, &c. &c. }	8	1	46
B. Garden - - - - - }	0	3	10
C. Part of Pightle (formerly Woolley's) - - - - - }	0	2	13
D. Adjoining shrubbery and lawn	0	0	37
E. Freehold part of garden -	0	1	14
F. Stable - - - - -	0	0	2
G. Cottage and garden - -	0	1	0
<hr/>			
Total freehold -	10	2	11

*Copyhold in Hand.*

	A.	R.	P.
H. Sheds and yard - - - - -	0	0	21
I. Copyhold part of garden -	0	0	5
K. Woolley's, three acres -	3	1	21
L. Late Slatt's - - - - -	0	1	27
<hr/>			
Total of estate -	14	2	5

THEODORE I. pope, in *Biography*, was the son of a bishop of the same name, and born at Jerusalem. He succeeded John IV. in the papal chair in the year 642. Of this pope no material circumstance occurs, except his controversy with the church at Constantinople, concerning the doctrine of the Monothelites; and this controversy is so little interesting to our readers, that we shall pass it over without any farther notice. Theodore died in the year 649. Besides some letters relating to the above-mentioned controversy, a memorial against Pyrrhus, the deposed patriarch of Constantinople, and his errors, addressed to the Eastern bishops, is preserved. Bower.

THEODORE II. pope, a native of Rome, succeeded Romanus about the close of the year 898. During his possession of the see, which he held only for twenty days, he caused the body of his predecessor Stephen to be taken out of the Tyber, and interred in the Vatican, and declared all his acts to be legal and valid. Bower.

THEODORE LASCARIS I. a Greek emperor, was son-in-law of Alexius Angelus, who imprisoned his brother Isaac and usurped the throne. Having valiantly but unsuccessfully defended Constantinople against the French and Venetians in the year 1204, he withdrew from the scene of contest across the Bosphorus, and put himself at the head of a body of troops; but when he found that the confederates were pursuing him, he sought refuge with the Turkish sultan of Iconium. Being joined by the inhabitants of Bithynia, he took possession of the country from the river Meander to the Euxine sea, and fixed his residence at Nicæ, where he was crowned by the patriarch of Constantinople. When his father-in-law heard of his success, he went over from Greece,

Greece, where he had remained concealed, to Asia, and implored the assistance of the sultan of Iconium in recovering that part of his dominions of which Theodore had taken possession; and having induced him to march with 20,000 men, he laid siege to Antioch on the Meander. Theodore, at the head of 2000 men, marched to its relief, and routed the besiegers. The sultan renewed the contest, and singling out Theodore, beat him off his horse; but the emperor recovering himself, unhorsed the sultan, cut off his head, and placing it on a pole, terrified his enemies, so that they all fled. Alexis was carried, as a prisoner, to Nice, where he was confined. Theodore, having made peace with the Turks, formed a treaty with the Latin emperor of Constantinople, and spent the remaining eighteen years of his reign, in securing his newly-founded empire, which he transmitted to his descendants; bequeathing it, at his death, to his son-in-law, John Ducas Vatases. The Nicæan empire terminated about fifty-seven years after its establishment by the elevation of its possessor, Michael Palæologus, to the throne of Constantinople. *Anc. Un. Hist. Gibbon. Gen. Biog.*

THEODORE, bishop of Mopsuestia in Cilicia, was priest, and probably native, of Antioch, a disciple of Diodorus, and an intimate friend of John Chrysostom. He was ordained bishop in 392 or 394, and died in 428 or 429. Sozomen says, that he was well skilled in the sacred scriptures, and in the liberal sciences of the rhetoricians and philosophers; and Theodoret calls him the doctor of the whole church, saying that he was bishop thirty-six years, and that he wrote against all heresies, particularly those of Arius, Eunomius, and Apollinarius. He wrote commentaries probably upon all the books of the Old and New Testament, though two or three of them are not particularly mentioned: and in these commentaries, as Photius says, he avoided all allegorical interpretations, and confined himself to the historical and literal sense. He defended this mode in a work concerning allegory and history against Origen. Some have charged him with treating the book of Job, the Canticles, and the Psalms, with disrespect; but these are the accusations of his enemies, and perhaps founded in error, as he actually wrote comments on some of these books. The book of Job he is said to have represented as written in a fabulous manner, though founded on truth; the Canticles he is said to have considered as a nuptial poem, and the Psalms as chiefly referring to the history of the times. His other works were numerous, and related to the controversies of his times, and to various theological doctrines. Most of Theodore's works are now lost, but some fragments of them may be found, chiefly in Latin, and perhaps not fairly represented, in the Acts of the second general council of Constantinople, or the fifth general council, held in 553, and also in Facundus, and in the Greek Chains. Fabricius assures us, that his commentary upon the Twelve Prophets is still extant in manuscript in the emperor's library at Vienna; and Montfaucon speaks of its being in the library of St. Mark at Venice, as well as in the library at Vienna, and in the Vatican.

Theodore was no less celebrated as a preacher, than as a commentator and general writer: under the former character he was admired at Antioch, at Constantinople, and all over the East. Distinguished by his learning and liberality, considering the time in which he lived, he has been charged with adopting the sentiments of Nestorius and Pelagius; and some moderns have called him the parent both of Pelagianism and Nestorianism; whilst others allow, that he held the Pelagian principle, but are of opinion that the charge of Nestorianism is not so clear. The above-mentioned council devoted a conference to the examination of Theodore's writings; and began with reading a creed attributed to him:

upon which the bishops clamoured for an anathema against his books and his person, and against all who did not join in that anathema. Several bishops, however, rose in his defence, and refused to concur in the anathema. Some learned moderns have charged him with adopting sentiments concerning the person of Christ similar to those of the present Unitarians; but of this fact there is no satisfactory evidence. *Mosheim. Lardner.*

THEODORE of Tarsus, a monk of that city, was ordained bishop by pope Vitalian, and being sent into England in the year 668, at the desire of king Egbert, was appointed to govern the church of Canterbury. In this high station he assiduously employed himself in settling the faith and ecclesiastical discipline of England; and after having spent twenty years in the performance of various important and useful services, he died in 690, at the age of eighty-eight years. With a view to the restoration of the neglected discipline of penance, he published a book of canons, under the title of "Penitential." In this book, sins were distributed into various classes, according to their respective nature and aggravation; and various kinds of penance were assigned to them; forms of consolation, exhortation, and absolution were prescribed, and other such matters respecting discipline were regulated. This Penitential passed from Britain to other countries, and became the model of similar works. It is still extant, in an imperfect state; and an edition of it was published at Paris by Petit, in 1679, 4to. with notes and dissertations. *Dupin. Mosheim.*

THEODORE STUIDITA, an eminent ecclesiastic of the ninth century, was educated under Plato, head of the monastery upon mount Olympus, the government of which was committed to him in the year 795. By avowing his opposition to the marriage of Constantine Copronymus to one of the maids of honour of his wife, whom he had compelled for this purpose to take the religious vows, and by his separation from the communion of the patriarch of Constantinople, Theodore incurred banishment; but at the death of the emperor he returned, and was appointed abbot of the monastery of Studa, in the suburbs of Constantinople. On account of his disapprobation of the decision of a synod which declared the second marriage of Constantine lawful, he was banished a second time. After the death of the emperor Nicephorus, in 811, he returned from banishment, and was reconciled to the patriarch. For his zealous defence of image-worship in the reign of Leo, he was banished a third time, and treated by the emperor with great severity. In 821 the emperor Michael allowed him to return to Constantinople, where he indulged a freedom of speech that obliged him to withdraw. He died in the year 826, in his sixty-seventh year. He was a man of learning, and author of many works, which were published by Sirmond, in Greek and Latin, at the end of his own works. *Dupin. Mosheim. Gen. Biog.*

THEODORET, a learned prelate of the Greek church, was born at Antioch about the year 386, and placed at the age of seven in the monastery of St. Euprepius. He was educated under Theodore of Mopsuestia and John Chrysostom, and from his youth addicted himself to all the austerities and exercises of a monastic life. Upon the death of his parents, he distributed his whole property among the poor. In the year 420, or 423, he was consecrated, against his own inclination, bishop of Cyrus in Syria, in the Euphratensian province, the inhabitants of which were ignorant and barbarous, and notorious for their superstitious practices and heretical errors. Theodoret laboured industriously and successfully in enlightening and reforming them. In his own conduct he was an exemplary pastor; and in every thing

thing that related to his own gratification, he was self-denying and frugal, that he might possess more ample means of relieving the poor and promoting works of public utility. No bishop of his time was more active in performing the duties that pertained to his profession and station, or had greater influence in every kind of public business, particularly of an ecclesiastical nature. He was prudent in counsel, pacific in his temper, and always disposed to compromise differences that occurred, and to recommend mutual forbearance and union among contending parties. But like other pacificators, he could not escape obloquy and harsh treatment. Between him and Cyril, however, an irreconcilable antipathy subsisted, as was generally the case between the Eastern and Egyptian bishops; and this antipathy was manifested, even after Cyril's death, by his successor Dioscorus, who caused Theodoret to be anathematized, and to be deposed in a general synod at Ephesus. In the reign of the emperor Marcian, a general council was assembled at Chalcedon; and this council decreed, that Theodoret was worthy to hold his see, and he was accordingly restored to the church of Cyrus. He died, without any further molestation, in the beginning of the reign of the emperor Leo, A. D. 457 or 458.

Theodoret bears a high rank among the ancients as a commentator on the scriptures for the purity of his Attic style, and the clearness and good sense of his explanations. He wrote commentaries upon most parts of the sacred scriptures. His canon of the Old Testament was very little, if at all, different from that of the Jews. With regard to the New Testament, it appears that he received only four gospels, the book of Acts, which he ascribed to St. Luke, and fourteen epistles of the apostle Paul, upon which he wrote commentaries; digesting them according to the order of time in which they were written, and noticing the places from which they were sent. He has seldom quoted the Catholic epistles, though they are not wholly overlooked. He seems to have received the epistle of James, the first of Peter, and the first of John; but there is no certain proof that he received the book of the Revelation, or the other four Catholic epistles: so that we may conclude, that his canon of the New Testament was the same with that of the Syrian Christians. His "Ecclesiastical History," comprised in five books, may be considered as a supplement to those of Socrates and Sozomen; beginning where that of Eusebius ends, at the rise of Arianism in 322 or 323, and terminating in 428. Its style, according to Photius, is clear and sublime, but too much abounding in metaphors. It is deficient in chronological precision, but contains many valuable documents, and some remarkable circumstances, which other ecclesiastical historians have omitted. His "Philotheus," or treatise on the monastic life, the genuineness of which some have questioned without sufficient reason, relates the actions and extols the piety of the Eastern monks, and abounds with instances of the credulity and superstition of the times. In his work entitled "Of Heretical Fables," in five books, he distributes the different heresies into classes, and concludes with a statement of the faith of the Catholic church. "The Cure of the false Opinions of the Heathens," in twelve discourses, is a learned and valuable apology for Christianity. Lardner has given copious extracts from this performance, which merit high commendation. His other works consist of letters and tracts on different theological subjects. They are all comprised in the best edition of his writings, which is that of Father Sirmond, in four vols. fol. Gr. and Lat. printed at Paris in 1642. To these the Jesuit Garnier added a fifth in 1684. Beaufobre gives the following candid account of Theodoret. "Theodoret is, in my opinion, one of the most

valuable of the Fathers. He is learned; he reasons well, especially in his dialogues against the Greek heresies of his times: he is a good literal interpreter of the scriptures. I cannot but admire his prudence and moderation, when I consider that he ended his ecclesiastical history at the time when the Nestorian disputes, in which he was so deeply interested, begun. But, I fear, his zeal against heretics imposed upon him almost as much, as his admiration of the heroes of the Ascetic life, with whom he was charmed. Monasteries have undoubtedly sent forth great men into the world; but the disciples of the monks contracted in their youth a superstitious disposition which is scarcely ever shaken off; and the weak side of this able man seems to have been an excessive credulity." Dupin. Mosheim. Lardner. Beaufobre.

THEODORIC I., king of the Visigoths, was the son of Alaric, and in 419 succeeded Wallia in the kingdom established in the south of France. After raising the siege of Arles, he made peace with the Romans, and was subsidized by them in the Spanish war; but being desirous of renewing his attempts in Gaul, he took an opportunity, in 435, of resuming his hostilities against them, and laid siege to Narbonne; but being compelled to raise the siege, he was under a necessity of directing his attention to the safety of Toulouse, his own capital, which was invested by a body of Huns, under the command of count Litorius. In a very sanguinary engagement with the assailants, he totally routed them, and took Litorius prisoner; who was first exposed to the insults of the populace at Toulouse, and then thrown into a dungeon, where he died. After this event, Theodoric made peace with the Romans. His rank among the sovereigns of that period was respectable; and both his sons and daughters were well educated. The latter formed matrimonial connections with the eldest sons of the kings of the Suevi and Vandals, who reigned in Spain and in Africa. But these connections proved unfortunate. The husband of the Suevian princess was massacred by his brother; and the Vandal princess, being suspected of a design to poison her father-in-law, Genferic, was doomed to lose her nose and ears, and in this mutilated condition was sent home to her father. Theodoric eagerly sought an opportunity for revenging this cruel insult. With this view, the Visigoths and Romans formed an alliance to resist Attila the Hun, who, instigated by Genferic, invaded Gaul in 441; and Theodoric, at the head of his army, marched to the relief of Orleans, which was besieged by the Huns. In their way the hostile armies met on the plains of Chalons, and a dreadful battle ensued. Theodoric was wounded by a Goth in the service of Attila, and being dismounted, was trampled to death under the feet of his own cavalry. When his body was found, his funeral rites were performed in the face of the retiring enemy.

THEODORIC, king of the Ostrogoths, surnamed the *Great*, was a descendant of the Gothic race of the Amali, and born near Vienna, A. D. 455. At the age of eight years, he was sent to Constantinople as a hostage for the fulfilment of the subsidiary treaty formed by the emperor Leo with the Goths. Here he had an opportunity of acquiring that character which he sustained among the princes of that age: but his means of instruction must have been very limited, when it is considered that, though he excelled in all military exercises, he was so badly taught, as not to be able to write his own name. After ten years' residence at the court of Leo, he returned to his father, Theodimir, who was then the sole ruler of the Ostrogoths, in whose service he distinguished himself by his martial spirit. Upon the death of his father, in 475, the crown devolved on Theodoric. The emperor

peror Zeno, wishing to secure the attachment of the young prince, invited him to his court, and conferred upon him the rank of patrician. After having rendered substantial service to the emperor, he was reduced to the necessity of deserting the Roman cause, and forming an alliance with Theodoric, the son of Triarius. Having been altogether neglected by Zeno, he marched in an hostile manner into the fertile provinces of Thrace, which he laid waste with wanton cruelty. In the war that ensued between the empire and the Goths, a variety of events occurred; but, upon the whole, Theodoric became more and more formidable, and by the death of the son of Triarius, he was placed at the head of his nation. Such was the power he acquired, that the emperor found it necessary to cede to him part of Lower Mœsia and Lower Dacia, and to honour him with the consulate, which office he discharged at Constantinople. But conceiving that he was an object of jealousy, and that his life was in danger, he withdrew into Thrace, and afterwards avowed himself an undisguised enemy to the empire. Declining to lay siege to Constantinople, he determined, as it is said, at the suggestion of Zeno, to turn his forces against Odoacer, who having deposed Augustulus, the last Western emperor, had assumed the title of king of Italy.

In the year 488, Theodoric, having collected together all the swarms of Goths that had successively arrived on the frontiers of the empire, set out on his Italian expedition; and after encountering many difficulties in his progress, descended from the Italian alps, and reached the banks of the Sontius near Aquileia. Here, in August 489, he attacked Odoacer's numerous host, and forced him to retreat as far as the plains of Verona. The result of a second engagement was a complete victory on the part of the Goths, which compelled Odoacer and his fugitives to take refuge within the walls of Ravenna, while the conqueror obtained possession of the cities of Pavia and Milan. But, as the fortune of war is uncertain, one of Odoacer's commanders, having deserted to Theodoric, proved treacherous, and induced several of the officers of the Gothic king to join his former master. Odoacer, having also gained an accession of other fugitives from the Gothic service, recovered Milan, and obliged Theodoric to immure himself in Pavia. Theodoric, however, in this crisis of danger, obtained a powerful reinforcement from Alaric II. king of the Visigoths, settled in Gaul, and attacking Odoacer on the Adna, totally defeated him. Upon this disaster, Odoacer fled to Ravenna; where, in the autumn of 492, he was besieged by Theodoric, who had made himself master of all Italy, except this city. In the following spring, Odoacer was reduced to the necessity of proposing terms of accommodation, with which Theodoric complied; and the consequence was the surrender of Ravenna to the Gothic army. It was stipulated between these two sovereigns, that they should govern Italy with equal authority. Such a stipulation was not likely to produce any permanent effect; and it was very soon violated on the part of Theodoric, by an act which entails on his memory eternal dishonour. Having invited Odoacer to a banquet, he stabbed him, as it is said, with his own hand, under a pretext that his dead rival had formed a similar design with regard to himself. After this event, Theodoric assumed the ensigns of royalty, and caused himself to be proclaimed by his army "king of Italy." This assumption was reluctantly confirmed by Anastasius, the successor of Zeno. The manner in which he exercised the royal authority, however unwarrantable the means by which he acquired it, placed him far above all the sovereigns of that age. Sicily having been united to Italy by a voluntary cession, Theodoric sheathed the sword of war, and cultivated alliances with neighbour-

ing powers for the security of his kingdom. He established peace with the imperial court at Constantinople, married a daughter of the king of the Franks, and bestowed his own two daughters by a concubine, one on the king of the Visigoths, and the other on the son of the king of the Burgundians, and his sister on the king of the Vandals. He secured the attachment of his soldiers by assigning to them a third part of the lands of Italy; and he restricted the military profession to his countrymen the Goths, whilst he encouraged industry and the arts of peace among his Italian subjects. The Goths held their lands and benefices as a military stipend, in consideration of which they were engaged to march on a summons under their provincial officers: and the whole extent of Italy was distributed into the quarters of a well-regulated camp. The civil offices were committed to the native Italians; and the form of government, and distribution of magistracies and of provinces, which had prevailed under the emperors, were continued; so that the transfer of power from the Romans to the Goths was scarcely perceived. The taxes remained the same, and on occasion of any public calamity, were remitted. He fixed his ordinary residence at Ravenna; and when he removed his court, it was to Verona. In the year 500 he visited Rome, and was treated with respect. He issued edicts for preventing the demolition of ancient monuments, and appropriated revenues to the repair of public edifices. He decorated other cities of Italy; and it has been said, that, after the flourishing times of Rome, this country was never so prosperous and happy. He provided a fleet for guarding the country against maritime attacks: and those wars by land in which he engaged, were terminated without disturbing the peace and hazarding the security of Italy. By his prudent conduct, and military achievements, he maintained the balance of power in the West, till it was overthrown by the ambition of Clovis, who defeated and put to death Alaric, the Visigoth king: nevertheless he saved the remainder of his family and people, and checked the career of the Franks.

Theodoric, with regard to his religious sentiments and profession, was an Arian; but he manifested no ardent zeal for making proselytes to his own opinions, nor did he molest others in their profession. Such was the government of Theodoric, that it reflected a short-lived lustre on the Gothic name, and established an era of public happiness which it is pleasing to contemplate. His secretary Cassiodorus, who was himself a man of erudition, and who caused his untaught master to patronize literature, has recorded in his twelve books of Epistles, the events at which we have here glanced. It must not be disguised, however, that the reign of Theodoric was not exempt from the evils inseparable from a despotism upheld by military power. The yoke of a foreigner was galling; and more especially that of a foreigner who was considered as a barbarian and a heretic. The tolerant principles of Theodoric did not accord with the orthodox zeal of his subjects; and his punishment of some outrages committed against the Jews, who were settled in the cities of Italy, was represented as a persecution of the church. An intolerant edict against the Arians, issued by the Byzantine court, provoked the king to retaliate on the Catholics under his jurisdiction; and shortly before his death an order was prepared to forbid the exercise of the Catholic worship in Italy after a certain day. In the mean time, jealousies of the senatorial party in Rome, and of their connection with the imperial court, took possession of the mind of Theodoric, who was made suspicious by age; and an instance of tyranny inflicted upon two exemplary characters, says one of his biographers, is unhappily the last act recorded of a sovereign distinguished for the mildness and equity of his administration. For an ac-

count of the circumstances to which we here refer, see the article *BOETHIUS*. Theodoric, at the close of life, reflected without doubt with remorse and self-reproach on his conduct towards Boethius and Symmachus. It is said that, whilst he was sitting at table, he perceived the gaping head of a large fish, which was served up before him, and at the sight exclaimed, that he beheld the angry and menacing countenance of Symmachus. Then probably did that fever commence, which being attended with a dysentery, terminated his life within three days, August, A.D. 526, in the 72d year of his age, and the 34th of his reign, dating its commencement with the death of Odoacer. His dominions were divided by his testament between his two grandsons, Amalaric and Athanaric, assigning the Rhone as their boundary; and the guardianship of the latter, who was king of Italy, was entrusted with his daughter Amalafuntha. He erected to his memory a splendid monument in a conspicuous situation above the city of Ravenna. *Anc. Un. Hist.* Gibbon's *Rom. Hist.* *Gen. Biog.*

*THEODORIC*, or *THIERRY of Niem*, an ecclesiastical writer, was born at Paderborn, and served Gregory XI. Urban VII. and several succeeding popes, as under-secretary. The time in which he lived may be inferred from his "History of the Schism of the Popes," written between the years 1400 and 1410; in which work he says that he had lived near thirty years at the court of Rome, and that being then worn down with age, it was his intention to withdraw from public business. This work, composed in Latin, comprised, in three books, the interval from the death of Gregory XI. to the election of Alexander V. Another work relating to the same subject was entitled "Nemus Unionis." In 1412 he published a "Treatise on the Rights and Privileges of the Emperors in the Investiture of Bishops and Abbots." He also wrote a journal of the proceedings of the council of Constance, ending in June 1416, in which year he died. From his own observation, he exhibits a shocking picture of the court of Rome, and the clergy of that period. Dupin. Moreri.

*THEODOROPOLIS*, in *Ancient Geography*, a town of Mœsia, founded by the emperor Justinian, who called it after the name of his wife.

*THEODORUS*, in *Biography*, a Cyrenaic philosopher, was a disciple of Anicerris, and for speaking freely concerning the gods, he was stigmatized with the appellation of Atheist, and banished from Cyrene. At Athens, where he sought refuge, he was protected by Demetrius Phalereus, and gained access to the court of Ptolemy Lagis. Afterwards, upon his return to Athens, he is said to have suffered death by hemlock; but it has been disputed whether atheism, or contempt of the Grecian superstitions, was the cause of his death. He is joined by Sextus Empiricus with Eumerus, and others, who maintained, that those who were esteemed gods, were men who had possessed great power on earth; and Clemens Alexandrinus expresses his surprize, that Eumerus, Nicanor, Diagoras, Theodorus, and others, who had lived virtuously, should be pronounced atheists from their opposition to gentile polytheism. Brucker by Enfield, vol. i.

*THEODORUS*, an Athenian flute-maker, the father of Isocrates the orator. How great the demand was at this time for flutes at Athens, may be conceived from a circumstance mentioned by Plutarch in his life of the orator. His father, says he, acquired wealth sufficient by his business, not only to educate his children in a liberal manner, but also to bear one of the heaviest public burdens to which an Athenian citizen was liable; that of furnishing a choir or chorus for his tribe, or ward, at festivals and religious ceremonies. See *ISMENIAS*.

*THEODOSIA*, in *Ancient Geography*, a town situated on the S.E. coast of the Tauric Chersonesus. See *CAFFA*.—Also, a town of Asia, in the Greater Armenia.

*THEODOSIOPOLIS*, a town of Asia, in the Greater Armenia, on the frontiers of Perfermania.—Also, a town of Asia, in Mesopotamia, upon the river Chaborras.

*THEODOSIUS I.* surnamed the *Great*, in *Biography*, a Roman emperor, was the son of an eminent general of the same name, who was executed for treason at Carthage in the year 376. He was born about the year 346, as some say, at Caucha, in Gallicia, or according to others, at Italica, near Seville. His education was liberal, and he learned the art of war by serving under his father, both in Britain and in Africa. The death of his father put a temporary stop to his military career, and he retired to Spain for the improvement of his mind and the culture of his paternal estate. He was in this situation when the emperor Valens was killed in battle, and the empire was left in great danger. Thus circumstanced, the other emperor, Gratian, sent for Theodosius, and in January, A.D. 379, declared him his partner in the empire. To him was committed the care of Thrace and the eastern provinces, threatened at this time by numerous bands of barbarians. The result of his campaign was, that some of the Goths submitted to his authority, and the rest evacuated Thrace. Having been baptized in the second year of his reign, in consequence of a dangerous disease, he became a zealous advocate for the orthodoxy of the church, and was much applauded by the Catholics. He issued an edict, enjoining the subjects of his government to adhere steadfastly to the religion taught by St. Peter, which asserts the sole deity of the Father, the Son, and the Holy Ghost, under an equal majesty and a pious Trinity; and to assume the title of Catholic Christians, all other persons who did not embrace this doctrine being branded as infamous heretics, and their churches being declared conventicles. It also announces, that besides the condemnation of divine justice, these persons must expect the severe penalties which his authority, guided by heavenly wisdom, shall think proper to inflict upon them. This declaration, so incompatible with the genuine spirit of the religion and the profession in which he had been initiated, was followed by correspondent deeds. When he entered Constantinople, after the campaign of 380, his first act was to remove the patriarch Demophilus, and to offer him the alternative of subscribing the Nicene creed, or resigning all his dignities to the orthodox party. The patriarch nobly chose the latter alternative, and withdrew into exile. Soon after he issued a decree for expelling from their churches all the clergy who refused to accept the Nicene creed, and he appointed a military force for the execution of it. By these measures the emperor succeeded, without tumult or bloodshed, in establishing, through the provinces of the East, the Catholic faith upon the ruins of Arianism. So assiduous was the emperor in this exercise of his zeal, that he is said to have promulgated, in fifteen years, at least fifteen penal edicts against heretics, some of which denounced capital punishment: and it is moreover asserted, that the office of inquisitors of the faith was first instituted in his reign. It has been affirmed, however, that he chiefly meant intimidation, and that the threatened penalties were seldom carried into effect.

The military ardour of this emperor seems to have been exercised with greater prudence than his religious zeal. In order to liberate the provinces from the barbarians, he contrived to weaken their strength by fomenting divisions among their chiefs, and he conciliated others by his generosity: so that about four years after the death of Valens, he signed a capitulation with the whole nation of the Goths;

and as their own country was occupied by the Huns, he permitted them to settle in Thrace and Mœtia, with exemptions from tribute and taxes. With Maximus, who had revolted against the emperor Gratian, Theodosius entered into a treaty, by which it was stipulated that the usurper should retain the countries beyond the Alps, and that Valentinian, the brother of Gratian, should be secured in the possession of the remaining part of the Western empire. Maximus was acknowledged by Theodosius as his colleague in the Roman empire, and Arcadius, the son of Theodosius, though only eight years of age, was admitted to a share in the purple. At this time Theodosius issued some severe edicts against heathen idolatry: and he passed a law against the marriage of cousins-german, which condemned both parties to be burnt alive, and which declared their children illegitimate. In 386, the Gruthungi, or Ostrogoths, in their attempt to pass the Danube, were defeated with great slaughter. In 387, Maximus invaded Italy; and Valentinian, deserted by his subjects, took refuge in the dominions of Theodosius, who married Galla, the sister of that emperor. In this year the people of Antioch, having without effect remonstrated against the proceedings of Theodosius, both as to religious matters and the imposition of an extraordinary tax, broke out into an insurrection; threatened the life of the governor; and, disappointed in this effort of their rage, demolished the statues of the emperor and his family. Theodosius, in the first transports of resentment, upon receiving intelligence of their conduct, ordered the city to be laid in ashes, and all the inhabitants, without discrimination of age or sex, to be put to the sword. Upon cooler reflection he revoked this sanguinary order, and contented himself with degrading Antioch from the rank of a city, and depriving the inhabitants of their customary largess of bread. Those who upon inquiry were found guilty, were condemned to death. But by the intercession of the bishop of Antioch, and other holy men, the culprits were pardoned, and the city restored to all its privileges.

Theodosius, on a visit to Valentinian at Thessalonica, prevailed on him to renounce Arianism, and to adopt the Nicene faith; and determined to take up arms in his cause against Maximus. After several successful encounters with the usurper, he was deposed of all his imperial ornaments, and dragged like a malefactor into the presence of Theodosius, who caused him to be beheaded. His son Victor was also put to death; and the civil war terminated A.D. 388. In consequence of these events, Theodosius became the sole head of the Roman world; and he invested the son of Valentinian, now a minor, with the sovereignty of the provinces wrested from him by Maximus, and also with the possession of Gaul, Spain, and Britain, of which Gratian had been deprived by this usurper. Theodosius remained three years in Italy, giving vigour to the law, correcting abuses, and adopting a variety of measures for totally eradicating paganism.

In 390, a sedition took place at Thessalonica, which was followed by many disastrous consequences, and by the exercise of a degree of cruelty, which the emperor was obliged to expiate by a public penance. About this time he took advantage of a religious tumult at Alexandria for demolishing the famous temple of Serapis, and of all the heathen temples throughout Egypt. He also issued a final edict against the ancient worship.

In 392, the emperor Valentinian was murdered by his general Arbogastes, and Eugenius was placed on the throne. When this measure was announced to Theodosius, he prepared for war; and having obtained a favourable answer from a holy hermit in Thebais, whom he consulted, issued new

edicts against heresy, and abrogated the ancient penalties of treason against those who uttered seditious words against the prince; he openly took up arms, A.D. 394, and forcing the passage of the Alps, descended into Italy. He met Eugenius and Arbogastes with a great force, and after several conflicts, Eugenius was totally defeated, and put to death by the soldiers. His children, however, and those of Arbogastes, who put an end to his own life after the battle, were treated humanely, and removed to their paternal possessions.

After this success, Theodosius sent for his son Honorius to Milan, and declared him emperor of the West; Arcadius having been already put in possession of the Eastern empire. In January 395, Theodosius terminated his life by a dropical disorder at Milan, at the age of fifty years, and at the close of the sixteenth year of his reign.

The name of Theodosius has been celebrated, but his character has been very differently appreciated. Politically considered, whilst it exhibits many virtues and excellencies, it is chargeable with many errors and obliquities. Connected with the ecclesiastical interests of the period in which he lived, his conduct on various occasions was altogether indefensible; and we may add, that how much soever he has been extolled by partial historians, his bigotry and intolerance were very reprehensible. *Anc. Un. Hist. Gibbon's Rom. Hist. Gen. Biog.*

THEODOSIUS II., son of the emperor Arcadius, and grandson of the preceding Theodosius, was born in the year 401; and being of feeble faculties, was educated merely to sustain the pageantry of a throne; or, as Mr. Gibbon expresses it, "to represent with grace and dignity the external figure of a Roman emperor." His only active pursuit was hunting; and his more private exercises were painting and carving, making elegant transcripts of religious books, and singing psalms. He also fasted, gave credit to miracles and doctrines presented to his faith, and paid due homage to all the dead and living saints of the Catholic church. His disposition was gentle and kind; in his conduct he was free from vices, and yet, as his biographer says, "he did not rise to virtues." Upon his father's death, A.D. 408, he succeeded him in the Eastern empire. To the influence of his sister Pulcheria, superior in talents to himself, he implicitly submitted; and in 414 he raised her to the rank of Augusta, and entrusted with her the reins of government. By her selection and recommendation he married, A.D. 421, the celebrated Athanasia, afterwards named Eudocia. The war which broke out in 422, in consequence of a persecution excited by the Magi against the Christians, terminated in a truce of a hundred years, and a division of the kingdom of Armenia between the contending powers. On the death of the emperor Honorius, in 423, the throne of the West was usurped by John; but Theodosius restored it to its proper heir, Valentinian III., who afterwards married his daughter. When Attila made an irruption into the Roman empire, he was opposed by Theodosius, whose armies were repeatedly defeated: and Theodosius himself was compelled in 446 to make a humiliating treaty with the king of the Huns. By one of his favourites, the eunuch Chrysaphius, he was induced to free himself from Attila by assassination, but the treachery was defeated, and he received a just and severe reprimand from the barbarian. Soon after this mortification, he died in consequence of a fall from his horse, A.D. 450, in the fiftieth year of his age. What his grandfather had done towards the subversion of the Pagan religion in the East, Theodosius completed. He always approved himself a dutiful son of the church, but he is said to have favoured the Eutychian heresy. His principal merit was the publication, A.D. 438, of the

"Theodosian Code." Anc. Un. Hist. Gibbon. Gen. Biog.

THEODOSIUS, an eminent mathematician, was born at Tripoli, and flourished about the second or third century. On the doctrine of the Sphere he wrote three books, containing a considerable number of propositions, demonstrated in the pure geometrical manner of the ancients, and establishing the geometrical principles of astronomy. Ptolemy and succeeding writers availed themselves of these books, which were translated by the Arabians from the original Greek into their own language. They were afterwards translated from the Arabic into Latin, and printed at Venice; but the defects of the Arabic version were supplied in a more complete edition, published in Greek and Latin at Paris in 1556, 4to. by John Pena, regius professor of astronomy. On this work there have been many comments; but the edition of Theodosius's Spherics now generally used is that of Dr. Barrow, published in 1675, illustrated and demonstrated in a new and concise method. Theodosius was also the author of two other treatises, one "De Habitationibus," and the other "De Diebus et Noctibus." Greek copies of these were preserved in the king's library at Paris, and a Latin edition was published by Peter Dasypodius in 1572. Montucla Hist. des Mathem.

THEODULF, a learned prelate of a Gothic family, was a native of Cisalpine Gaul; and being invited to France by Charlemagne, he was promoted to the bishopric of Orleans, A.D. 794, and the abbacy of the monastery of Fleury. He continued in favour at court till the death of Charlemagne, and for some time under the emperor Lewis. But being implicated in the conspiracy of Bernard, king of Italy, against Lewis, he was committed to prison at Angers, where he remained in confinement for three years. After his liberation, and before his return to his diocese, he died at Angers, about the year 821. Theodulf was the friend of Alcuin, and deserves honourable mention as one of the votaries and promoters of literature in a dark age. He was the author of several works, published by Father Sirmond, in 1646, 8vo. One of his hymns, beginning

"Gloria, laus et honor tibi sit, Rex Christe Redemptor,"

has been adopted by the Catholic church for the service on Palm-Sunday. Dupin. Gen. Biog.

THEOGAMIA, Θεογαμία, in *Antiquity*, a Sicilian festival, in honour of Proserpine, which seems to have been instituted in memory of her marriage with Pluto.

THEOGNIS, in *Biography*, a Greek poet, was a native of Megara, in Attica, and flourished about the year B.C. 546. He has been denominated "Gnomologus," or the writer of sentences: and we have extant a work written by him, without order, consisting of moral maxims or precepts, simply expressed and destitute of poetical ornaments, versified probably for assisting the memory. Athenæus reckons him among the advocates for licentious pleasures; and Suidas refers to a work of his composition, entitled "Exhortations" or "Admonitions," which contained various impurities. In the verses that now remain, nothing of this kind appears; so that if the charge be true, they must have undergone castigation. "The Sentences of Theognis" have been often printed by themselves, and with the works of other minor Greek poets. Among the best editions are those of Camerarius and Sylburgius. Vossii Poet. Græc. Gen. Biog.

THEOGONY, formed from Θεο, *God*, and γέννησις, *geniture, seed, offspring*, that branch of the heathen theology which taught the genealogy of their gods.

Hesiod gives us the ancient theogony, in a poem under

that title. This poem treats of the origin and descent of the gods; or rather, under the allegorical dress of theogony, represents the formation of the world, and the history of eminent men. The plan of this work is intricate and confused. (See HESIOD.) The writer seems to have made use of several different theogonies, and to have blended them together with little regard to consistency. He also frequently adds, for the sake of poetical ornament, fictions of his own, which have no relation to the history and origin of the world. Aristophanes, in his comedy of "The Birds," has introduced a description of the formation of the world, which was borrowed, without doubt, from the ancient theogonies; but it deserves little attention. All the theogonies make an eternal chaos the origin of all things. Thus Ovid. Met. l. 1. v. 5.

"Ante mare, et terras, et quod tegit omnia cælum,  
Unus erat toto naturæ vultus in orbe,  
Quem dixere Chaos, rudis indigestaque moles,  
Nec quicquam nisi pondus iners, congestaque eodem  
Non bene juncturam discordia femina rerum."

"Ere sea and earth, and heav'n's high canopy  
Were form'd, great Nature's face was one;  
A lifeless, rude, and undigested mass  
Of jarring seeds in one wild chaos lay." See CHAOS.

Whether, besides this chaotic mass, the ancient theogonies suppose an infinite, active, intelligent principle, who from the first matter formed the universe, is a question that has occasioned much debate. It is evident, upon the most cursory review of the ancient theogonies, that God, the great Creator of all things, is not expressly introduced; but it is doubted, whether the writers meant to exclude him from their system, or indirectly to suppose his existence, and the exertion of his power in giving motion to matter. In the solution of this question, it ought to be considered, whether the theogonists supposed God to have existed before chaos, and to have created it from nothing; or thought him to have sprung from a pre-existing chaos; or conceived God and matter to have been two co-existing and independent principles: whether they imagined God to have been the soul of nature, informing the eternal mass of matter; or were of opinion, that God sent forth matter as an emanation from himself; if the latter, whether this emanation was the effect of necessity, or of a free act of volition; whether it was from all eternity, or began at some limited period of duration. It must also be inquired, whether, according to the doctrine of the theogonies, a divine mind interposed in the formation of the world, or the effect was produced by the necessary laws of motion acting upon homogeneous and heterogeneous portions of matter. If the latter of these was their doctrine, it is to be farther considered, whether it necessarily follows, that they denied the existence of God, or whether it may not be supposed, that, neglecting all consideration of deity, they only endeavoured to explain the physical formation of the world, by laws originally impressed upon matter by the author of nature.

The theogonies certainly do not suppose God to have been prior in the order of time to matter: they speak of chaos as eternal, and seem to have been wholly unacquainted with the doctrine of creation from nothing. But, on the other hand, they never suppose the Deity to be derived from chaos: for Jupiter is not to be confounded with the Supreme Being, but merely to be considered as the chief of those inferior divinities, who, according to the Grecian theology, were either portions of the divinity, inhabiting and animating parts of nature, or departed spirits of heroes and illust.

Illustrious men, exalted to divine honours. There is no sufficient proof, that Orpheus, Hesiod, or any other Grecian cosmogonist, supposed two independent principles in nature: for, though they ascribe the origin of evil to Chaos, they might, nevertheless, be of opinion, as we shall find to have been the case with many later philosophers, that matter is derived from God.

There were, perhaps, different opinions among the ancient cosmogonists, concerning the first cause of nature. Some might, possibly, ascribe the origin of all things to a generating force, destitute of thought, which they conceived to be inherent in matter, without looking to any higher principle. But it is probable, that the general opinion among them was that which had prevailed among the Egyptians and in the East, and was communicated by tradition to the Greeks, that matter, or chaos, existed eternally with God, and that by the divine energy of emanation, material forms were sent forth from him, and the visible world arose into existence. This principle being admitted, the whole system of the ancient theogonies appears consistent, and a satisfactory explanation may be given of most of the Grecian fables. Upon this supposition, the sum of the doctrine of the theogonies, divested of allegory and poetry, will be as follows:

The first matter, containing the seeds of all future being, existed from eternity with God. At length, the divine energy upon matter produced a motion among its parts, by which those of the same kind were brought together, and those of a different kind were separated, and by which, according to certain wise laws, the various forms of the material world were produced. The same energy of emanation gave existence to animals and men, and to gods who inhabit the heavenly bodies, and various other parts of nature. Among men, those who possess a larger portion of the divine nature than others, are hereby impelled to great and beneficent actions, and afford illustrious proofs of their divine original, on account of which, they are after death raised to a place among the gods, and become objects of religious worship.

Upon the basis of these notions, it is easy to conceive, that the whole mythological system, and all the religious rites and mysteries of the Greeks, might be founded. Brucker's Hist. Phil. by Enf. vol. i.

Among the most ancient writers, Dr. Burnet observes, that theogony and cosmogony signified the same thing. (See COSMOGONY.) In effect, the generation of the gods of the ancient Persians, fire, water, and earth, is apparently no other than that of the primary elements.

**THEOLOGICAL CRITICISM.** See CRITICISM.

**THEOLOGICAL Prebend.** See PREBEND.

**THEOLOGIUM**, formed from  $\Theta\epsilon\omicron\varsigma$ , and  $\lambda\omicron\gamma\omicron\varsigma$  *speech*, or *discourse*, in the ancient theatre, was a place, or little stage, above that on which the ordinary actors appeared. See THEATER.

The theologium was the place where their gods appeared. It also included the machines on which they descended, and from which they spoke.

There was a theologium required for the representation of the Ajax of Sophocles, the Hippolitus of Euripides, &c. Scal. Poet. lib. i. cap. 1.

**THEOLOGY**, compounded of  $\Theta\epsilon\omicron\varsigma$ , *God*, and  $\lambda\omicron\gamma\omicron\varsigma$ , *discourse*, *divinity*; a science, which instructs us in the knowledge of God, and divine things; or which has God, and the things he has revealed, for its object.

Theology is a science which shews us what we are to believe of God, and the manner in which he would be served.

It is divided into two branches, the *natural*, and the *revealed* or *supernatural*.

**THEOLOGY, Natural**, is the knowledge we have of God from his works, by the light of nature, and reason.

**THEOLOGY, Supernatural**, is that which we learn from revelation. See RELIGION.

**THEOLOGY, Positive**, is the knowledge of the holy Scriptures, and of the signification of them, conformably to the opinions of the fathers and councils; without the assistance of any argumentation. But some will have it, that this ought to be called *expositive*, rather than *positive*.

**THEOLOGY, Moral**, is that which teaches us the divine laws relating to our manners and actions; in contradistinction to

**THEOLOGY, Speculative**, which explains and establishes the doctrines of religion, as objects of faith.

**THEOLOGY, Scholastic**, or *School*, is that which proceeds by reasoning; or that derives the knowledge of several divine things from certain established principles of faith. See SCHOLASTIC Divinity.

The ancients, according to Varro, Scævola, and Plutarch, had a three-fold theology; the first  $\mu\upsilon\theta\iota\kappa\eta$ , *mythic*, *fabulous*, which flourished among the poets; and was chiefly employed in the theogony, or genealogy, and history of the gods: to whom all things were attributed, which men, and even the vilest of men, could be guilty of. Nevertheless, the popular religion and worship were in a great measure founded upon that mythology, which run through the whole of their religion, and was of great authority with the people. Many unexceptionable proofs of this are produced by Dr. Leland, in his "Advantage and Necessity of the Christian Revelation," vol. i. part i. chap. 6.

The second,  $\pi\omicron\lambda\iota\tau\iota\kappa\eta$ , *political*, or *civil*, was that established by the Roman laws, and chiefly embraced by the politicians, priests, and people, as most suitable and expedient to the safety, quiet, and prosperity of the state. This, though not the true, was the vulgar theology, and constituted the public and authorized religion. It was that which the philosophers themselves, whatever private opinions or speculations they might entertain, or dispute of in their schools, universally conformed to in their own practice, and also exhorted others to do so. Varro informs us, that this theology particularly determined what gods they were publicly to worship, what sacred rites they were to observe, and what sacrifices to offer.

Although even the vulgar among the Pagans seem, in general, to have had some notion of one supreme God, yet their theology was properly polytheism; and the providence they acknowledged, was the providence, not of one God, but of many gods. The learned Dr. Cudworth, who seems inclined to put the most favourable construction upon the Pagan theology, acknowledges, that the civil theology, as well as the poetical, had not only many fantastic gods in it, but an appearance of a plurality of independent deities; several being made supreme in their respective territories or functions. Aristotle (Oper. tom. i. p. 1246. edit. Paris, 1629) intimates, that according to the laws of cities and countries, that is, in the civil or political theology, there seems to be no one absolutely powerful or all-perfect being, but a plurality of gods, one of whom is supposed to be more powerful in one respect, and another in another respect. Besides, the public religion was made up partly of the physical, and partly of the poetical theology. Those poetical fables, which Varro censures as unworthy of the gods, and as ascribing to them actions which none but the vilest of men

men would be guilty of, were not only permitted to be acted on the public theatres, and heard with pleasure by the people, but they were regarded as things pleasing to the gods themselves, by which they were propitiated and rendered favourable; and accordingly they were taken into the public religion. Games were celebrated, and plays were founded upon them; and the public games and plays were on certain occasions considered as acts of religion, encouraged by their deities, and celebrated in honour of them. It is also justly observed, that the images, forms, habits, and ornaments of their gods, their different sexes and ages, and the sacred festivals instituted to their honour, had all of them a reference to the fables of the poets and mythologists, and were founded upon them; so that the civil and the fabulous theology might each of them be called civil, and each fabulous. Hence proceeded many absurd and ridiculous, and many immoral and inhuman rites, which were made use of in the worship of their gods, and which were either prescribed by the laws, or were established customs, countenanced by the magistrates, and which had obtained the force of laws, and may, therefore, be regarded as belonging to the public religion of the Pagans. See Leland's *Christian Revelation*, ubi supra, cap. 7.

The third, *evangelical, natural*, was chiefly cultivated by the philosophers, as most agreeable to nature and reason. The physical or natural theology acknowledged one only supreme God; to which it added demons or spirits, as mediators between him and man.

Dr. Leland has urged a variety of considerations to prove that, notwithstanding the high encomiums which have been bestowed upon the philosophical theology of the Pagans, it was of little use in leading the people into a right knowledge of God and religion, and for reclaiming them from their idolatry and polytheism. To this purpose he observes, that, if the philosophers had been right in their own notions of religion, they could have but little influence on the people, for want of a proper authority to enforce their instructions. The affected obscurity of the Pagan philosophers was another cause which rendered them unfit to instruct the people in religion: to which it may be added, that some of them used their utmost efforts to destroy all certainty and evidence, and to unsettle men's minds as to the belief of the fundamental principles of all religion; and even the best and greatest of them acknowledged the darkness and uncertainty they were under, especially in divine matters. The philosophers themselves were also, for the most part, very wrong in their own notions of the Divinity; they very much corrupted the ancient tradition relating to the one true God and the creation of the world, and endeavoured to account for the formation of all things without the interposition of a Deity. And the opinions of those philosophers who were of a nobler kind, were chargeable with great defects: they generally expressed themselves in the polytheistic strain, and instead of leading the people to the one true God, they spoke of a plurality of gods, even in their most serious discourses; ascribing those works to the gods, and directing those duties to be rendered to them, which properly belong to the supreme. The philosophers likewise referred the people for instruction in divine matters to the oracles, which were managed by the priests: this was particularly the case with Socrates, Plato, and the Stoics.

It was an universal maxim among them, that it was the duty of every wise and good man to conform to the religion of his country; and they not only worshipped the gods of their respective countries according to the established rites, and exhorted others to do so; but when they

took upon themselves the character of legislators, and drew up plans of laws, and of the best forms of government, polytheism, and not the worship of the one true God, was the religion they proposed to establish. Moreover, they employed their learning and abilities to defend and justify the popular idolatry and polytheism. The worship of inferior deities was recommended by them, under pretence that it tended to the honour of the supreme. Some of the most eminent of them endeavoured to colour over the most absurd part of the Pagan poetical theology, by allegorizing the most indecent fables. They apologized for the Egyptian animal worship, which the generality of the vulgar Pagans in other nations ridiculed. They vindicated idolatry and image-worship, as necessary to keep the people from falling into irreligion and atheism; and besides, some of the more refined philosophers were against any external worship of the supreme God.

Many of the philosophers, and of the learned and polite Pagans, denied a providence. Of those who professed to acknowledge it, some confined it to heaven and heavenly things; others supposed it to extend to the earth and to mankind, yet so as only to exercise a general care and superintendency, but not to extend to individuals; others, again, supposed all things, the least as well as the greatest, to be under the care of providence; but they ascribed this not to the supreme God, who, they thought, was above concerning himself with such things as these, and committed the care of them wholly to inferior deities. See the illustration and proof of these several allegations by Dr. Leland, ubi supra, cap. 10—17.

THEOLOGY, *Bachelor in*. See BACHELOR.

THEOLOGY, *Mystic*. See MYSTIC.

THEOLOGY, *Polemical*. See POLEMICAL.

THEOMANTIA, *Θεομαντία*, in *Antiquity*, divination by the supposed inspiration of some deity. For a particular account of which, see Potter, *Archæol. Græc. lib. ii. cap. 12. tom. i. p. 298*.

THEON, in *Biography*, a mathematician of the Platonic school, was a native of Smyrna, and flourished under the emperors Trajan and Adrian. His mathematical treatises are said to have been written for the purpose of elucidating the philosophy of Plato; and his discourses, treating of geometry, arithmetic, music, astronomy, and the harmony of the universe, may serve to throw some light upon the Pythagorean system. Part only of his work, "De iis quæ in Mathematicis ad Platonis lectionem utilis sunt," or that which relates to arithmetic and music, has been published. The remainder, which pertained to astronomy and geometry, is said to have been preserved in the Ambrosian library at Milan. Ptolemy refers to his astronomical observations. Brucker by Enfield. Montucla *Hist. des Math.*

Another mathematician of the same name belonged to the Alexandrian school, and flourished about A.D. 365. He was the father of the learned but unfortunate Hypatia; His works are various: among these we may mention his "Recensio Elementorum Euclidis," published by Commandini; his "Facti Græci priores, et Fragmenti Commentarii in Ptolomæi Canonem expeditum, sive Recensio succincta Chronologica regem a Nabonassaro ad Antoninum Pium:" "Scholia in Aratum," said to be interpolated; and "Commentarius in Magnum Ptolomæi Syntaxin," which is incomplete. Montucla.

THEOPASCHITES, THEOPASCHITÆ, in *Ecclesiastical History*, a sect of heretics in the fifth century, the followers of Petrus Fullensis, or Peter the Fuller, who usurped the see of Antioch; and after having been several times

times deposed, and condemned, on account of his opposition to the council of Chalcedon, was at last fixed in it, A.D. 482, by the authority of the emperor Zeno, and the favour of Acacius, bishop of Constantinople; whence they are also sometimes denominated *Fulloniani*.

Their distinguishing doctrine was, that the whole Trinity suffered in the passion of Jesus Christ.

This heresy was embraced by the Eutychian monks of Scythia, or, according to La Croze, of Egypt; who using their utmost efforts to make it obtain, raised great disorders towards the beginning of the following century.

It was condemned, at its first rise, in the councils of Rome and Constantinople, held in 483. It was again revived in the ninth century, and again condemned in a council at Rome, held in 862, under pope Nicolas I.

F. le Quien, in his notes on Damascenus, says, that the same error had been taught before Fullensis, by Apollinarius, whose disciples were the first that were called *Theopaita*, or *Theopaschita*.

THEOPHANES, in *Biography*, a Greek historian and poet, was of noble extraction, and born at Mitylene, in the island of Lesbos. About the commencement of the Mithridatic war, he is supposed to have come to Rome in his youth; and when Pompey was appointed to the chief command against Mithridates, he took Theophanes with him to record his exploits, procuring for him the citizenship of Rome, and adding to his name those of "Cornelius Balbus." It is also supposed that it was principally on his account, that on his return he visited Lesbos, and restored to the Mitylenians the privileges of which they had been deprived by the Roman senate. At Rome he connected himself with the most distinguished citizens, and he was deputed to Alexandria for the confirmation of treaties of alliance with Ptolemy Auletes. After the defeat of Pompey at Pharsalia, he accompanied him in his flight; and by his advice this commander declined to take refuge with Juba, king of Mauritania, and sailed to Egypt, where he met his fate. Theophanes afterwards joined the party of Cæsar. The most important of his writings was a "History of the Wars of the Romans, in different Countries under the Command of Pompey." Of this work there remain only five fragments, quoted by Strabo, Plutarch, and Stobæus; but Plutarch is supposed to have made great use of his authority in his life of Pompey, though he does not speak favourably of his character. He says, "Theophanes asserts, that in the private papers of Mithridates taken at Cænon, there was found a memorial, composed by Rutilius (Rufus), exhorting Mithridates to massacre all the Romans in Asia. But it is generally believed, that this was a malicious fiction of Theophanes to blacken Rutilius, whom probably he hated, because he was a perfect contrast to himself; or it might be invented by Pompey, whose father was represented by Rutilius in his history, as one of the worst of men." Rutilius was a man of such excellent character, as to be incapable of the crime with which he is charged; and without doubt such a falsification of history, for base and private purposes, is sufficient to destroy all esteem for the writer.

Of the poetry of Theophanes, which was celebrated in his time, there remain only two epigrams, inserted in the *Anthologia*. Vossius. Moreri. *Gen. Biog.*

THEOPHANES, GEORGE, a Constantinopolitan Greek, of a rich and noble family, married young, but from superstitious motives lived in a state of celibacy. He afterwards became a monk. At the general council held in 787, he was present, and was treated with respect. When Nicephorus, patriarch of Constantinople, was exiled by the

emperor Leo the Armenian, Theophanes paid him extraordinary honours, and was himself banished to the Isle of Samothrace, where he died in 818. His chronicle, commencing where that of Syncellus terminated, was extended to the commencement of the reign of Michael Curopalata. This was printed at Paris, with the Latin version and notes of F. Goar, under the care of Combefis, in 1665, fol. It is valuable for its facts, but displays the credulity and weak judgment of a superstitious mind. Vossius. *Gen. Biog.*

THEOPHANES PROKOPOVITCH (the son of Procopius), archbishop of Novogorod, a learned Russian historian, and miscellaneous writer, was born at Kiof in the year 1681, and having studied under his uncle Theophanes at the Bratskoi convent in Kiof, travelled into Italy in his eighteenth year. In three years he completed his course of preparatory study, and then returned to his native town, where he read lectures on the Latin and Slavonian art of poetry, at the seminary where he had received his education. Having assumed the monastic habit, with the name of Theophanes, he was appointed, at the age of twenty-five, prefect of the seminary, and professor of philosophy. By a Latin oration and a sermon, delivered before czar Peter the Great, he attracted his notice, and was chosen his companion in his war against the Turks. In 1711 he was made abbot of the monastery of Bratskoi, rector of its seminary, and professor of divinity. By censuring the ignorance of the clergy, and endeavouring to excite a taste for literature, he recommended himself to the czar as a proper coadjutor in his plans for reforming the church. He was accordingly placed at the head of the synod, in the new ecclesiastical establishment, the plan of which he had prepared, and in 1718 he was promoted to the bishopric of Pleskof. In 1720 he was created archbishop of the same diocese, and soon after the accession of Catharine I. he was advanced to the rank of archbishop of Novogorod, and metropolitan of all Russia; and in this station he died in 1730. This prelate was in a high degree the patron of literature, and engaged in a variety of ways, by his personal munificence and labour, in promoting it. His works were sermons and theological tracts, a treatise on rhetoric, and rules for composing Latin and Slavonian poetry, Latin verses, and more especially the Life of Peter the Great, terminating with his battle of Pultawa. Le Clerc asserts that he endeavoured to persuade Peter to introduce the Protestant religion into Russia, and that this event would have taken place, if it had not been prevented by Peter's death. The prelate's education at Rome, and the high rank he sustained in his own church, render this anecdote improbable. Coxe's *Travels in Russia*.

THEOPHANIA, Θεοφανία, formed of Θεός, *God*, and φαίνω, *I appear*, in *Antiquity*, a festival observed by the Delphians upon the day on which Apollo first manifested himself to them.

THEOPHANY, in *Church History*, is sometimes used in the same sense with *Epiphany*.

THEOPHILA, in *Ancient Geography*, a town of India, on this side of the Ganges.

THEOPHILE, named *Viaud*, in *Biography*, a French poet, was born at Clerac, in the Agenois, about the year 1590. By education he was a Calvinist, but in his conduct and writings he was licentious. In 1619 he withdrew to England, and unsuccessfully attempted to introduce himself to king James. After his return he abjured Calvinism, but his manners remained the same. On account of a work entitled "Le Parnasse Satirique," published in 1622, and attributed to him, in which were several pieces offensive to decency

decency and religion, he was prosecuted. Being arrested in Picardy, he was brought to Paris, and thrown into the dungeon that had been occupied by Ravallac, where he remained for two years. He was at length released by the parliament, and sentenced to banishment. The duke of Montmorency took him under his protection, and at his hotel he died in 1626. His writings are partly prose and partly verse. His verses are negligent and irregular, but they display genius and imagination. His works consist of odes, elegies, sonnets, &c.; tragedies; a dramatic dialogue on the immortality of the soul, entitled "Socrate Mourant;" apologies for himself, and letters. A collection of his poems and apologies was printed at Rouen in 1627, 8vo.; and his friend Mairet printed his French and Latin letters at Paris, in 1642, with his portrait prefixed. *Nouv. Dict. Hist. Gen. Biog.*

THEOPHILUS, emperor of Constantinople, was the son of Michael the Stammerer, and succeeded his father in 829. He began his reign with the exercise of justice in its utmost rigour, heedless not only of the claims of gratitude, but of the feelings of humanity. His father had been indebted for his life and crown to the murderers of his predecessor Leo IV. Theophilus, under a pretence of paying the debts of his father to those who had contributed to his elevation, summoned them, among other considerable persons in the empire, to his presence; and desiring the former to withdraw into an adjoining apartment, that their claims might be examined, he ordered them, on their own confession, to be capitally punished. In another case, a poor woman threw herself at his feet, complaining of the injury which she had sustained from a powerful neighbour (the empress's brother), who had raised the wall of his palace so high, that her humble dwelling was deprived of light and air. Theophilus gave her the palace, with the ground upon which it stood, and caused the offender to be stripped and scourged in the public square of the city. The effect of his singular rigour, though altogether indefensible, was, that a scrutiny of seventeen days could not discover a single crime or abuse in the court or city.

During this emperor's whole reign he was engaged in wars with the Saracens, the detail of which we shall omit. Theophilus died in 842, after a reign of more than twelve years. His zeal against the worship of images has caused his character to be treated with great severity, and his faults to be exaggerated. Although he was inexcusably rigorous in his administration, he was a reformer of manners. Of his superiority to avarice, and high ideas of the dignity of the regal character, the following anecdote furnishes an instance. Seeing one day a merchant-ship, which was deeply laden, entering the harbour of Constantinople, he asked the mariners to whom it belonged: they replied, "to the empress." "God has made me (he exclaimed) a prince, and is my wife a merchant? If princes trade, their subjects must starve!" he then ordered the vessel to be set on fire with all her cargo. *Anc. Un. Hist. Gibbon's Rom. Hist.*

THEOPHILUS, bishop of Antioch, was ordained to this see in 168 or 170, and governed it for twelve or thirteen years. In his zeal against heresy, he wrote against Marcion and against Hermogenes, and he composed other tracts, some of which are preserved. We have also extant three books against Autolyceus, a learned heathen, in which he displays great learning, and from which it appears that he had once been a heathen. These works afford, as it is said, the earliest example of the use of the term "Trinity," applied by the author to the three persons of the Godhead. Some have supposed that he approaches to Arianism, when

he asserts that the Word may exist in *place*, and that he was begotten in *time*. Theophilus's books to Autolyceus were published in Latin by Conrad Gefner at Zurich, in 1546, and were inserted in the "Orthodoxographia," Basil, 1555. They were annexed in Gr. and Lat. to the Supplement of the "Bibliotheca Patrum," 1624; and were printed at the end of St. Justin's Works by Morellus. Lardner.

THEOPHILUS, bishop or patriarch of Alexandria, of violent and turbulent disposition, was ordained to that see in 385. He gained reputation and influence by his zeal in destroying the temple of Serapis, and other pagan temples of Egypt in 389. (See THEODOSIUS.) He was, under the guise of a friend, a secret enemy to John Chrysostom, after he had been ordained to the see of Constantinople in 397. Without much real regard for religion, he was the zealous champion of orthodoxy; and having called a council at Alexandria in 399, he prevailed with the assembly to condemn all the followers of Origen, and with the assistance of a band of soldiers, compelled them to abandon their residence on mount Nitria. The poor monks, failing to find a secure refuge, repaired to Constantinople, to lay their complaints before the emperor. The humanity of John Chrysostom irritated Theophilus, who was employed by the empress Eudoxia, for prosecuting her revenge against Chrysostom. Accordingly, he arrived at Constantinople at the head of a body of Egyptian sailors and dependent bishops, avowing that he was going to depose John. His purpose was executed at the synod of Chalcedon in 403. (See CHRYSOSTOM.) His malignity pursued this venerable prelate in his exile, by a libel filled with abusive expressions, which was translated at his request by Jerom, from Greek into Latin. Theophilus died at Alexandria in 412. The most considerable of his works was a large treatise against Origen. Some of his epistles are found among those of Jerom, and some of his canonical epistles are contained in the collections of Zonaras and Balsamon. Of this prelate Dupin has given the following character: "There is nothing in the writings of Theophilus that can turn to his commendation; they are obscure, unintelligible, and full of false and impertinent reasonings and reflections. He was a good politician, but a bad author. He knew better how to manage a court intrigue, than to resolve a question in divinity. The only rule for his opinions was his interest or his ambition. He was ready to embrace any opinion or party that suited his purpose, without examining whether it was just or reasonable." Dupin. Lardner. Gibbon.

THEOPHRASTA, in *Botany*, so called in memory of the father of all natural historians, Theophrastus, native of Eresos in the isle of Lesbos; whence Plumier named this genus *ERESIA*. (See that article.) Linnæus on such occasions always preferred the appellation by which the person intended to be celebrated was best known.—*Linn. Gen. 84. Schreb. 110. Willd. Sp. Pl. v. 1. 324. Mart. Mill. Dict. v. 4. Swartz Obs. 58. Juss. 150. Lamarck Illustr. t. 119. (Eresia; Plum. Gen. 8. t. 25.)*—Class and order, *Pentandria Monogynia. Nat. Ord. Apocineis affine, Juss.*

Gen. Ch. *Cal.* Perianth inferior, small, of one leaf, in five deep, obtuse, permanent segments. *Cor.* of one petal, bell-shaped, spreading, cut more than half way down into five rounded equal segments. "Nectary five small, ovate, obtuse glands, thickest at the point, lying upon the segments of the corolla." *Jacq.—Stam.* Filaments five, thread-shaped, united below to an internal membrane, so as to form a short, thick, furrowed column, crowned with a five-rayed horizontal disk; anthers five, of two separate oblong lobes,

lobes, attached to the sides of each segment of the disk, underneath. *Pist.* Germen superior, ovate; style cylindrical, the length of the stamens, erect; stigma in five obtuse lobes. *Peric.* Berry globose, coated, of one cell. *Seeds* several, roundish, somewhat compressed.

*Ess. Ch.* Corolla bell-shaped, in five obtuse spreading segments, with a nectary of five incumbent glands. Berry coated, of one cell, with several seeds.

1. *Th. americana.* Large-fruited Theophrasta. Linn. Sp. Pl. 212. Willd. n. 1. Swartz Obf. 59. (*Erefia foliis aquifolii longissimis*; Plum. Ic. 119. t. 126.)—Leaves obtuse. Clusters terminal, erect.—Native of barren dry bushy shady places in Hispaniola. *Swartz.* Stem shrubby, one or two feet high, erect, simple, leafy in its upper half, round, thorny, clothed with rusty down. *Leaves* opposite or whorled, on very short stalks, erect, oblong-lanceolate, obtuse, tapering at the base, very rigid, serrated; their serratures alternately inflexed and reflexed, each tipped with a small, prominent, rigid, black-pointed spine. *Footstalks* thick, rufous, closely pressed to the stem. *Clusters* short, terminal, from the midst of the terminal leaves, many-flowered, partial *flower-stalks* numerous, short, curved, single-flowered. *Fruit* two inches in diameter, yellow, brittle, often for the most part hollow or empty, its *receptacle* juicy at the bottom. *Seeds* black, hard, attached by their base. *Swartz.* We presume the *clusters*, from Plumier's figure, to be erect, and the *seeds* numerous.

2. *Th. longifolia.* Small-fruited Theophrasta. Jacq. Coll. v. 4. 136. Hort. Schoenbr. v. 1. 62. t. 116. Willd. n. 2.—Leaves acute. Clusters lateral, drooping.—Native of the Caraccas. It flowered in the stove at Schoenbrun from August till November. The *stem* is said to be twenty feet high, but always unbranched. *Leaves* imperfectly whorled, near two feet long, reclining, with spinous serratures, smooth, of a dark shining green, with numerous transverse veins from the mid-rib. *Clusters* numerous, scattered between the whorls of leaves, stalked, drooping, a span long, of numerous little orange-coloured or scarlet *flowers.* *Fruit* in its native country about an inch in diameter, with about four *seeds*; but in the garden it did not attain more than half that size, and perfected only one. If there be no mistake in Dr. Swartz's description of the first species, there is a prodigious difference between the stature of the two. Yet we have a suspicion, that they may possibly not be more than varieties of each other. As to the generic character, Plumier's representation of the parts of the *flower* is too imperfect for us to suppose him more right than the faithful Jacquin. Swartz's description may easily be reconciled with the *Hortus Schoenbrunensis.*

THEOPHRASTICS, a name given to the followers of Paracelsus, from his name Theophrastus.

THEOPHRASTUS, in *Biography*, a distinguished Greek philosopher, the favourite pupil of Aristotle, and nominated by him as his successor in the school of the Lyceum, was born at Eresium, a maritime town of Lesbos, in the second year of the 102d Olympiad, B.C. 371. His first rudiments of education were received under Alcippus in his own country, and being sent by his father to Athens, he became first a disciple of Plato and afterwards of Aristotle. Such were his natural talents, that, under such tuition, he made great progress both in philosophy and eloquence: so that his original name, Tyrtamus, was changed, either by his master or his followers, into Theophrastus. After he undertook the Peripatetic school in the year B.C. 323, his reputation was so distinguished, that the number of his scholars was about 2000. His erudition and engaging manners recommended him to the notice of Cassander and

Ptolemy: by the former he was invited to Macedon, and by the latter to Egypt; and among the Athenians he was so great a favourite, that, when he was accused by one of his enemies of teaching impious doctrines, the accuser could not without difficulty escape the punishment which he endeavoured to bring upon Theophrastus. Theophrastus is no less highly celebrated for his generosity and public spirit, than for his industry, learning, and eloquence. He is said to have twice saved his country from the oppression of tyrants; and he contributed liberally towards defraying the expence of public meetings held by philosophers for learned and ingenious conversation. In the public schools he appeared, after the manner of Aristotle, in an elegant dress, and was very attentive to the graces of elocution: and hence it is said he obtained the appellation of Theophrastus, the divine speaker. Towards the close of life, which was prolonged to the age of 85 years, he became very infirm, and was conveyed to the school in a carriage. In contemplating the shortness of life, he expressed great regret; complaining that long life was granted to stags and crows, to whom it was of little value, but was denied to man, who, if it were of longer duration, might attain the summit of science: whereas now, as soon as he arrives within sight of it, he is taken away. His last advice to his disciples was, that since it is the lot of man to die as soon as he begins to live, they should take greater pains to enjoy life as it passes, than to acquire posthumous fame. A large body of Athenians attended his funeral.

The works of Theophrastus comprehended a variety of subjects, and were numerous. His doctrine differed in some respects from that of his master Aristotle. He taught that the predicaments, or categories, were as numerous as the motions and changes to which beings are liable; and that among motions, or changes, are to be reckoned desires, appetites, judgments and thoughts. He maintained, that all things are not produced from contraries; but some from contraries, some from similar causes, and some from simple energy; that motion is not to be distinguished from action; and that there is one divine principle of all things, by which all things subsist. By this divine principle, it is thought that Theophrastus meant the First Mover, without whom other things could not be moved, and therefore could not subsist. Of his moral maxims, the following are the most worthy of notice. "Respect yourself, and you will never have reason to be ashamed before others. Love is the passion of an indolent mind. Blushing is the complexion of virtue. Time is the most precious expenditure."

Few of his works, of which Diogenes Laertius enumerates more than 200, have reached our time: of these, the most famous is entitled "Characters," describing different moral classes of men, such as the flatterer, the impudent, the discontented, the garrulous, the superstitious, &c.; so distinguished and described, as to shew great knowledge of mankind. Of his other works on natural history, the principal are his "History of Plants," in nine books, which Haller has particularly recommended to the notice of botanical students; "On the Causes of Plants," relating chiefly to the natural and artificial means of bringing them to maturity; to agriculture and horticulture; to the tastes and odours of vegetables; "On Stones;" "On Winds;" "On Fire;" "On Honey;" "On the Signs of Fair Weather, and of Tempests and Rain;" "On Animals which change their Colour;" "On Animals which are born suddenly;" "On Fish which live out of Water." Theophrastus ranks amongst the most distinguished of the ancients for comprehensive genius and diligent enquiry into nature. The last edition of the whole extant works of Theophrastus is that

of Dan. Heinsius, Greek and Latin, fol. Lugd. Bat. 1613. Of his history of plants, the most complete is that of Budzus, Greek and Latin, fol. Amst. 1644. Among the most esteemed editions of his "Characters," which are numerous, we may reckon those of H. Casaubon, of Needham, with the notes of Duport, Cantab. 1712, and of I. Fr. Fischer, Coburg. 1763. Diog. Laert. Brucker by Enfield. Haller Bib. Bot.

**THEOPHYLACT**, named *Simocatta*, a Greek historian, a native of Greece, but of Egyptian origin, flourished about A.D. 612. His history of the reign of the emperor Maurice is comprehended in eight books, and terminates with the massacre of this prince and his children by Phocas. Casaubon reckons Simocatta one of the best of the later Greek historians. The work just mentioned was printed at the Louvre, in 1647, fol. and forms a part of the Byzantine historians. An edition of his "Epistles, Moral, Rural, and Amatory," was given by Aldus. His "Physical Problems" were published first by Vulcanius at Leyden, and afterwards by Andrew Schottus. His "History of the Habitable World" is cited by Eustathius, in his Commentary on the Periegesis of Dionysius. Gen. Biog.

**THEOPHYLACT**, archbishop of Acris, the capital of Bulgaria, was a native of Constantinople, and flourished under the emperors Michael Ducas, Nicephorus Botoniates, and Alexis Comnenus. After his elevation to the archbishopric of Acris, by the persuasion of the wife of Ducas, he diligently laboured in propagating the Christian faith, and composed several works, which give him rank among the principal ecclesiastical writers of his age. The time of his death is not known; but he was living in 1071. His "Commentaries on the Four Gospels, the Acts of the Apostles, and the Epistles of St. Paul," which are his chief work, are for the most part abridged from Chrysostom and others. He also wrote "Commentaries on the Minor Prophets." Several editions of his Commentaries have been published in Greek and Latin, and also in Latin only. "Seventy-five Epistles" of this author were published by Meursius, in Greek, in 1617, and a Latin translation in 1622. Some other tracts have been attributed to this author. Dupin says, that the Commentaries of Theophylact are very useful for the literal explanation of the Scriptures: and Lardner observes, that he quotes no forged writings or apocryphal books of the New Testament, many of which he excludes by his observation on John, i. 31—34. that Christ wrought no miracle in his infancy, or before the time of his public ministry. Dupin. Lardner.

**THEOPNEUSTÆ**, Θεοπνευσται, formed of Θεός, *God*, and πνεύω, *I breathe*, an epithet given to enthusiastical diviners.

**THEOPOLIS**, in *Ancient Geography*, a town of Gallia Narbonensis, belonging to the Aventici, N.E. of Forum Novum.

**THEOPROPRIA**, Θεοπροπρια, formed of Θεός, *God*, and υπερει, *I excel*, a designation given to oracles. See ORACLE.

**THEOPSIA**, Θεοπσια, formed of Θεός, *God*, and οπτομαι, *I see*, in *Mythology*, denoted the appearance of gods. Cicero, Plutarch, Arnobius, and Chrysostom, mention appearances of this kind.

**THEORBO**, THORBA, or Tiorba, a musical instrument, made in form of a large lute; except that it has two necks, or jugs, the second and longer of which sustains the four last rows of chords, which are to give the deepest sounds. See LUTE.

The word is formed from the French *teorbe*, or *theorbe*,

and that from the Italian *tiorre*; which signifies the same, and which some will have to be the name of the inventor.

The theorbo is an instrument which for many years succeeded to the lute, in the playing of thorough basses; it is said by some to have been invented in France, by the sieur Hotteman, and thence introduced into Italy, &c.

The only difference between the theorbo and the lute is, that the former has eight bass or thick strings twice as long as those of the lute; which excess of length renders their sound so exceedingly soft, and keeps it up so long a time, that it is no wonder many prefer it to the harpsichord itself. At least it has this advantage over it, that it is easily removed from place to place, &c.

All its strings are usually single; though there are some who double the bass-strings with a little octave, or the small strings with an unison; in which case, bearing more resemblance to the lute than the common theorbo, the Italians call it the *arcileuto*, or arch-lute.

**THEOREM**, in the *Mathematical Method*, a proposition which terminates in theory, and which considers the properties of things already made or done.

Or, a theorem is a speculative proposition, deduced from several definitions compared together. Thus, if a triangle be compared with a parallelogram standing on the same base, and of the same altitude, and partly from their immediate definitions, and partly from other of their properties already determined, it is inferred, that the parallelogram is double the triangle: that proposition is the theorem.

*Theorem* stands contradistinguished from *problem*.

There are two things to be chiefly regarded in every theorem, *viz.* the proposition and the demonstration: in the first is expressed what agrees to some certain thing under certain conditions, and what does not.

In the latter, the reasons are laid down, by which the understanding comes to conceive, that it does or does not agree to them.

Theorems are of various kinds: as,

**THEOREM, Universal**, is that which extends to any quantity without restriction, universally. As this, that the rectangle of the sum and difference of any two quantities is equal to the difference of their squares.

**THEOREM, Particular**, is that which extends only to a particular quantity. As this: in an equilateral right-lined triangle, each of the angles is sixty degrees.

**THEOREM, Negative**, is that which expresses the impossibility of any assertion. As, that the sum of two biquadrate numbers cannot make a square number.

**THEOREM, Local**, is that which relates to a surface. As, that triangles of the same base and altitude are equal.

**THEOREM, Plane**, is that which either relates to a rectilinear surface, or to one terminated by the circumference of a circle. As, that all angles in the same segment of a circle are equal.

**THEOREM, Solid**, is that which considers a space terminated by a solid; that is, by any of the three conic sections. *E. gr.* this: that if a right line cut two asymptotic parabolas, its two parts terminated by them shall be equal. See SOLID.

**THEOREM, Reciprocal**, is one whose converse is true. As, that if a triangle have two equal sides, it must have two equal angles: the converse of which is likewise true, that if it have two equal angles, it must have two equal sides.

**THEOREM**, in *Algebra* and *Analysis*, is sometimes used to denote a rule, particularly when that rule is expressed in symbols or formulae, of which there is of course a great number; but of these, some few, either from their im-

portance,

# THEOREM.

portance, curiosity, or other considerations, have retained particular denominations, under which they are frequently referred to by modern authors: it is therefore necessary to have them so classed, that a reader may be able to ascertain the principles on which they are founded, the purposes they are intended to answer, and the cases to which they will best apply. The theorems to which we here allude, are Bernoulli's theorem, the Binomial theorem, Cotes's, Taylor's, Maclaurin's, &c.

*Bernoulli's Theorem*, is a general formula for the development of any fluent or integral, of any proposed fluxion or differential; which may be stated as follows: viz. X being any function of x,

$$\int X dx = X \frac{x}{1} - \frac{dX}{dx} \cdot \frac{x^2}{1 \cdot 2} + \frac{d^2X}{dx^2} \cdot \frac{x^3}{1 \cdot 2 \cdot 3} - \frac{d^3X}{dx^3} \cdot \frac{x^4}{1 \cdot 2 \cdot 3 \cdot 4}, \&c.$$

Let us denote by Y, the value of this integral when  $x = 0$ ,  $X, \frac{dX}{dx}, \frac{d^2X}{dx^2}, \&c.$  being also denoted by  $Y', Y'', Y''', \&c.$  and we shall have generally,

$$\int X dx = Y + Y' \frac{x}{1} + Y'' \frac{x^2}{1 \cdot 2} + Y''' \frac{x^3}{1 \cdot 2 \cdot 3} + \&c.$$

Now, in order to pass from the general value of  $\int X dx$ , which we shall represent by  $y$ , to that which answers to the case of  $x = 0$ , it is evident that we must in Taylor's formula make  $h = -x$ , which gives

$$Y = y - \frac{dy}{dx} \cdot \frac{x}{1} + \frac{d^2y}{dx^2} \cdot \frac{x^2}{1 \cdot 2} - \frac{d^3y}{dx^3} \cdot \frac{x^3}{1 \cdot 2 \cdot 3} + \&c.$$

substituting in this equation, in the place of  $y, \frac{dy}{dx}, \frac{d^2y}{dx^2}, \&c.$

their respective values, and taking that of  $\int X dx$ , we shall have

$$\int X dx = Y + X \cdot \frac{x}{1} - \frac{dX}{dx} \cdot \frac{x^2}{1 \cdot 2} + \frac{d^2X}{dx^2} \cdot \frac{x^3}{1 \cdot 2 \cdot 3} - \&c.$$

the quantity Y being still a constant arbitrary. By integrating, we arrive also at this development: thus, if we decompose the differential X dx into its two factors X and dx, and integrate the second, we shall have

$$\int X dx = Xx - \int x dX.$$

But

$$\int x dX = \int \frac{dX}{dx} \cdot x dx = \frac{1}{2} x^2 \frac{dX}{dx} - \frac{1}{2} \int x^2 \frac{d^2X}{dx^2}$$

$$\int x^2 \frac{d^2X}{dx^2} = \int \frac{d^2X}{dx^2} \cdot x^2 dx = \frac{1}{3} x^3 \frac{d^2X}{dx^2} - \frac{2}{3} \int x^3 \frac{d^3X}{dx^3}$$

$$\int x^3 \frac{d^3X}{dx^3} = \int \frac{d^3X}{dx^3} \cdot x^3 dx = \frac{1}{4} x^4 \frac{d^3X}{dx^3} - \frac{3}{4} \int x^4 \frac{d^4X}{dx^4}$$

&c.                      &c.                      &c.

And putting successively for  $\int x dX, \int x^2 \frac{d^2X}{dx^2}, \&c.$  their respective values, there results,

$$\int X dx = X \frac{x}{1} - \frac{dX}{dx} \cdot \frac{x^2}{1 \cdot 2} + \frac{d^2X}{dx^2} \cdot \frac{x^3}{1 \cdot 2 \cdot 3} - \&c.$$

which is the theorem of John Bernoulli, and is the same with regard to the integral calculus, as that of Taylor to the differential.

*Binomial Theorem*, or Newtonian theorem, is a general formula for the development of any binomial of the form  $(a + x)^n$ ; viz.

$$(a + x)^n = a^n \times \left\{ 1 + \frac{n}{1} \left(\frac{x}{a}\right) + \frac{n}{2} \cdot \frac{n-1}{2n} \left(\frac{x}{a}\right)^2 + \frac{n}{3} \cdot \frac{n-1}{2n} \cdot \frac{n-2}{3n} \left(\frac{x}{a}\right)^3 + \&c. \right\}$$

See BINOMIAL Theorem.

*Briggs's Theorem*.—There are more than one formula that have received this designation, but we believe that the following is generally understood to be implied; viz.

“The  $n$ th differences of any consecutive  $n$ th powers, or of any  $n$ th powers whose roots are in arithmetical progression, are expressed by the formula

$$n(n-1)(n-2)(n-3)(n-4) \dots 1 \cdot d^n$$

d being the common difference of the roots.”

The demonstration of this theorem is commonly made to depend upon principles drawn from the fluxional analysis; but we prefer giving a sketch of that which appeared in vol. xi. of the Irish Transactions by Mr. Burk, being deduced from the most elementary considerations.

We know that the expansion of  $(p + x)^n$ , is of the form

$$p^n + nx p^{n-1} + C x^2 p^{n-2} + D x^3 p^{n-3} + \&c.$$

Let  $o, p, q, r, s, \&c.$  be the terms of any decreasing arithmetical progression, of which the difference is d; then since  $o = p + d, p = q + d, \&c.$  we have

$$o^n = (p + d)^n = p^n + nd p^{n-1} + C d^2 p^{n-2} + \&c.$$

$$p^n = (q + d)^n = q^n + nd q^{n-1} + C d^2 q^{n-2} + \&c.$$

$$q^n = (r + d)^n = r^n + nd r^{n-1} + C d^2 r^{n-2} + \&c.$$

Taking the first, second, third, &c. differences, we have

### First Differences

$$nd p^{n-1} + C d^2 p^{n-2} + \&c.$$

$$nd q^{n-1} + C d^2 q^{n-2} + \&c.$$

$$nd r^{n-1} + C d^2 r^{n-2} + \&c.$$

And since  $p^{n-1} = (q + d)^{n-1} = q^{n-1} + (n-1)d q^{n-2} + \&c.$  we have for the

### Second Differences

$$nd(n-1)d q^{n-2} + \&c.$$

$$nd(n-1)d r^{n-2} + \&c.$$

$$nd(n-1)d s^{n-2} + \&c.$$

### Third Differences

$$nd(n-1)d(n-2)d r^{n-3} + \&c.$$

$$nd(n-1)d(n-2)d s^{n-3} + \&c.$$

### Fourth Differences

$$nd(n-1)d(n-2)d s^{n-3}(n-3)dr^{n-4} + \&c.$$

Whence, by an infallible and obvious deduction,

### nth Differences

$$nd(n-1)d(n-2) \dots (n-n+1)dw^{n-n}$$

### (n+1)th Differences

$$nd(n-1)d(n-2) \dots (n-n)dv^{-1}.$$

## THEOREM.

But since  $n - n = 0$ , the  $(n + 1)$ th differences  $= 0$ ; and since  $w^{n-n} = w^0 = 1$ , the  $n$ th differences become

$$n(n-1)(n-2)(n-3) \dots 3 \cdot 2 \cdot 1 \cdot d^n$$

It may not be amiss to observe, that we have only employed the first term of the several orders of differences, which however is sufficient for our purpose, since it is obvious that the  $n$ th difference can have but one term; for the development of  $(p + d)^n$  gives  $n + 1$  terms; and since one term vanishes with every difference, the first difference will have  $n$  terms, the second  $n - 1$ , the third  $n - 2$ , &c.; and consequently the  $n$ th difference will have  $n - (n - 1) = 1$  term only. See Irish Transactions, vol. xi. or Monthly Review, vol. lxxiv.

*Cotes's Theorem, or Cotesian Theorem.*—The geometrical properties of this very interesting theorem are explained under the article *COTESIAN Theorem*; it will only be necessary therefore in this place to state the same analytically. In this case, the general enunciation is:

“All the imaginary roots of the binomial equation  $x^n - 1 = 0$ , are contained in the general formula  $x^2 - 2 \cos \frac{2k\pi}{n} x + 1 = 0$ ; and those of  $x^n + 1 = 0$ , in the formula  $x^2 - 2 \cos \frac{(2k+1)\pi}{n} x + 1 = 0$ ,  $k$  being any integer not divisible by  $n$ , and  $\pi$  representing the semi-circumference.” See *RECIPROCAL Equations*.

*Euler's Theorem* is used to denote the theorem or formula first given by this author, for ascertaining the direct integrability of differential equations, which is as follows. The equation being reduced to the form

$$M dx + N dy = 0,$$

where  $M$  and  $N$  are functions of  $x$  and  $y$ ; if  $\frac{M}{dy} = \frac{N}{dx}$ , then

the integration may be obtained by a direct process; but if this equality have not place, the integration can then only be effected by indirect means, which frequently involve considerable difficulty.

*Fermat's Theorem.*—There are several theorems in the theory of numbers which are due to this ingenious analyst; but that which is more particularly designed by Fermat's theorem is this; *viz.* “Neither the sum nor difference of any two integral powers, above the square, can be equal to a rational power of the same dimension:” or, which is the same, the equation

$$x^n \pm y^n = z^n$$

is always impossible in rational numbers, if  $n$  be greater than 2.

The cases of  $n = 3$  and  $n = 4$  have been demonstrated; but notwithstanding the numerous attempts of the most celebrated analysts of the last and of the present age, the case of  $n = 5$ , and all the succeeding values of  $n$ , remain without demonstration; and as this is now the only theorem of this author which has not submitted to the power of the modern analysis, the National Institute of France has made it the subject of the prize of 3000 francs, to be decided by 1818.

Under the article *NUMBERS*, amongst the miscellaneous propositions, we have mentioned another theorem of Fermat's, which had not then been demonstrated, but which has since been effected by M. Cauchy, corresponding member of the Institute. The reader will also find some farther remarks relative to the equation  $x^n \pm y^n = z^n$ , under our article *POWER*.

*Gauss's Theorem* is used to denote a theorem invented by this distinguished mathematician, for the solution of certain binomial equations. We have seen, in the article *RECIPROCAL Equations*, in what manner the roots of binomial equations may be obtained by means of a table of sines and cosines; but Gauss's theorem is the converse of this, and shews in what manner the sines and cosines of certain angles may be obtained, by the numerical solution of such equations. See *POLYGON*.

*Guldin's Theorem* is the same as the *CENTROBARYC Method*; which see.

*Lagrange's Theorem* is commonly used to denote the general formula assumed by Lagrange as the foundation of his theory of functions; which may be thus enunciated.

“If  $\varphi x$  be any function whatever of a variable quantity  $x$ , and if  $x$  changes its value, and becomes  $x + i$ , then the  $\varphi(x + i)$  may be represented or resolved into a series of the form

$$\varphi(x + i) = \varphi x + P i + Q i^2 + R i^3 + \&c.$$

in which the co-efficients of the powers of  $i$  are new functions of  $x$ , derived from the primitive function  $\varphi$ , independent of  $i$ ; and, moreover, that every co-efficient is derived from the preceding one, in the same manner as the first is derived from the original function.” See *FUNCTIONS*.

*Leibnitz's Theorem* is a theorem proposed by this author for differencing under the sign  $\int$ , and it may be exhibited under the form  $\frac{d \int M dx}{dy} = \int \frac{dM}{dy} dx$ , where  $M = \frac{du}{dx}$ ,  $u$  being any function of  $x$  and  $y$ .

Since  $\frac{du}{dx dy} = \frac{du}{dy dx}$  by the known principles of the differential calculus; if we make  $u = \int M dx$ , we shall have  $\frac{du}{dx} = M$ ,  $\frac{d^2 u}{dx dy} = \frac{dM}{dy}$ ; and integrating with regard to  $x$ , we shall find

$$\int \frac{d^2 u}{dx dy} dx = \int \frac{d^2 u}{dy dx} dx = \frac{du}{dy} = \int \frac{dM}{dy} dx.$$

This is called by Leibnitz *differentiatio de curva in curvam*, because in the question which he proposed to resolve, he passed from one curve to another of the same species, by making one of the constant quantities variable. See *LA CROIX* “*Calcul Integral*.”

*Maclaurin's Theorem* is a formula which we owe to this author for expressing any function  $y$ , of a variable quantity  $x$ ; *viz.* adopting the differential notation,

$$y = (y) + \left(\frac{dy}{dx}\right)x + \frac{1}{2} \left(\frac{d^2 y}{dx^2}\right)x^2 + \frac{1}{2 \cdot 3} \left(\frac{d^3 y}{dx^3}\right)x^3 + \&c.$$

where  $(y)$ ,  $\left(\frac{dy}{dx}\right)$ ,  $\left(\frac{d^2 y}{dx^2}\right)$ , &c. represent what these several quantities become when  $x = 0$ .

Let  $y = A + Bx + Cx^2 + Dx^3 + \&c.$  differencing, and dividing by  $dx$ , we have

$$\frac{dy}{dx} = B + 2Cx + 3Dx^2 + \&c.$$

$$\frac{d^2 y}{dx^2} = 2C + 2 \cdot 3 Dx + \&c.$$

$$\frac{d^3 y}{dx^3} = 2 \cdot 3 D + \&c.$$

confe-

# THEOREM.

consequently, when  $x$  in each of these = 0, we have

$$(y) = A, \left(\frac{dy}{dx}\right) = B; \left(\frac{d^2y}{dx^2}\right) = C; \frac{1}{2 \cdot 3} \frac{d^3y}{dx^3} = D;$$

therefore,

$$y = (y) + \left(\frac{dy}{dx}\right)x + \frac{1}{2} \left(\frac{d^2y}{dx^2}\right)x^2 + \frac{1}{2 \cdot 3} \left(\frac{d^3y}{dx^3}\right)x^3 + \&c.$$

See Maclaurin's "Fluxions," and Boucharlat's "Calcul Differential, &c."

*Moirre's Theorem.* See the next article.

$$\left( A_0 + A_1 x + A_2 x^2 + A_3 x^3 + \dots + A_n x^n \right)^m = A^m +$$

$$\left. \begin{array}{l} m A_1 B_0 \cdot \frac{x}{A} + 2 m A_2 B_0 \\ + (m-1) A_1 B_1 \end{array} \right\} \frac{x^2}{2 A_0} + \left. \begin{array}{l} 3 m A_3 B_0 \\ + (2m-1) A_2 B_1 \end{array} \right\} \frac{x^3}{3 A_0} + \left. \begin{array}{l} 4 m A_4 B_0 \\ + (3m-1) A_3 B_1 \\ + (2m-2) A_2 B_2 \end{array} \right\} \frac{x^4}{4 A_0} + \&c.$$

$$+ \left. \begin{array}{l} (m-2) A_1 B_2 \\ + (m-3) A_1 B_3 \end{array} \right\}$$

Where  $B_0 = A_0^m$ , and  $B_1, B_2, B_3$ , &c. are the co-efficients of the terms immediately preceding those in which they first appear; and the manner of applying this theorem to any particular case, is by substituting the numbers or letters in the given example for  $A, A_1, A_2$ , &c. and the numerical value of  $m$  for  $m$ . It would lead us too far to attempt the demonstration of this theorem in this place, we must, therefore, refer the reader for such information to the works above-mentioned.

*Newtonian Theorem.* See BINOMIAL Theorem.

*Taylor's Theorem*, an elegant and highly valuable formula, which was first published by Dr. Brook Taylor in his "Methodus Incrementorum," which is as follows; viz.

"If  $Y$  represent any function whatever of the variable quantity  $x$ , and if  $x$  be increased by any difference  $\Delta x$ , the value of  $Y$ , viz.  $Y + \Delta Y$ , becomes (employing the differential notation)

$$Y + \Delta Y = Y + \frac{\Delta x dY}{1 \cdot dx} + \frac{\Delta x^2 d^2 Y}{1 \cdot 2 \cdot dx^2} + \frac{\Delta x^3 d^3 Y}{1 \cdot 2 \cdot 3 dx^3} + \&c.$$

$$\text{or } \Delta Y = \frac{\Delta x dY}{1 \cdot dx} + \frac{\Delta x^2 d^2 Y}{1 \cdot 2 \cdot dx^2} + \frac{\Delta x^3 d^3 Y}{1 \cdot 2 \cdot 3 dx^3} + \&c.$$

The demonstration of this celebrated theorem is given very concisely by La Croix, on the following principles.

Let  $Y$  be any function of  $x$ , and let  $Y'$  denote what this function becomes, when  $x$  becomes  $x + b$ , we may write

$$Y' = A + Bb + Cb^2 + Db^3 + \&c.$$

in which development, it is obvious that  $A, B, C$ , &c. are functions of  $x$ .

If now we difference this equation with  $b$  variable and  $x$  constant, we obtain, dividing by  $db$ ,

$$\frac{Y'}{db} = B + 2Cb + 3Db^2 + \&c.$$

Again, differencing with  $x$  variable and  $b$  constant, we have

$$\frac{Y'}{dx} = \frac{dA}{dx} + \frac{dB}{dx}b + \frac{dC}{dx}b^2 + \frac{dD}{dx}b^3 + \&c.$$

But as  $x$  and  $b$  enter exactly in the same manner, it follows

that  $\frac{Y'}{dx} = \frac{Y'}{db}$ , whence the first of these series is equal to the

*Multinomial Theorem*, sometimes called Moivre's theorem, having been first discovered by that author, is a general expression or formula for determining any power or root of a given quantity consisting of any number of terms. This theorem was first published by its author in N<sup>o</sup> 230. of the Phil. Transf. 1697; but it was afterwards simplified by Euler in his "Calcul Differential," and the same has also been done by Arbogast in his "Calcul des Derivations."

The general form of this theorem, as given in Bonycastle's Algebra, is as follows:

second; equating, therefore, the co-efficients of the like powers of  $b$ , we have

$$B = \frac{dA}{dx}, C = \frac{dB}{2 dx}, D = \frac{dC}{3 dx}, \&c.$$

Now

$$A = Y, B = \frac{dY}{dx}, C = \frac{d^2 Y}{1 \cdot 2 \cdot dx^2}, D = \frac{d^3 Y}{1 \cdot 2 \cdot 3 dx^3};$$

whence

$$Y' = Y + \frac{dY}{1 \cdot dx} b + \frac{d^2 Y}{1 \cdot 2 \cdot dx^2} b^2 + \frac{d^3 Y}{1 \cdot 2 \cdot 3 dx^3} b^3 + \&c.$$

Or writing

$$Y' = Y + \Delta Y, \text{ and } x + b = x + \Delta x,$$

we have

$$\Delta Y = \frac{\Delta x dY}{1 \cdot dx} + \frac{\Delta x^2 d^2 Y}{1 \cdot 2 \cdot dx^2} + \frac{\Delta x^3 d^3 Y}{1 \cdot 2 \cdot 3 dx^3} + \&c.$$

See La Croix "Calcul Differential," p. 21.

*Trinomial Theorem* is only a particular case of the *Multinomial Theorem*, which see.

*Wilson's Theorem* is a curious formula relative to prime numbers, published first by Waring in his "Meditationes Algebraicæ," which is as follows.

"If  $n$  be any prime number, then will

$$1 \cdot 2 \cdot 3 \cdot 4, \&c. (n-1) + 1$$

be divisible by  $n$ ."

This curious theorem was not demonstrated by sir John Wilson, who first discovered it, nor by Waring, by whom it was first made public; it has, however, since received different demonstrations from Lagrange, Gauss, &c. the latter of which is very simple, and has been adopted by Barlow in his "Theory of Numbers," to which work we beg to refer our readers, as it would require more room than we can allow ourselves to give it at full length in this place.

The above include, we believe, all those theorems which are known by any particular designation; there are, doubtless, many others equally important, and which are equally entitled to bear the names of their respective authors, but custom has not sanctioned the adoption; and we have, therefore, not introduced them.

THEO.

**THEORETIC, THEORETICAL,** or *Theoric*, formed from θεωρεω, *I see* or *contemplate*, something relating to theory, or that terminates in speculation. In which sense it stands opposed to *practical*.

The sciences are ordinarily divided into *theoretical*, as theology, philosophy, &c.; and *practical*, as medicine, law, &c. See SCIENCE.

**THEORETIC, Theoreticus**, is an appellation peculiarly given to an ancient sect of physicians, contradistinguished by it from the empirics. See EMPIRIC.

Theoretic physicians were such as applied themselves to a careful study and consideration of what relates to health and diseases; the principles of the human body, and its structure and parts, with their actions and uses; whatever befalls it, either naturally or preternaturally: the differences of diseases, their nature, causes, signs, indications, &c.; the textures, properties, &c. of plants, and other medicines, &c. In a word, the theoretic physicians were such as proceeded in their judgment and practice on the foot of reason, in opposition to the empirical physicians, who proceeded wholly on experience. See MEDICINE.

**THEORETICAL Arithmetic and Philosophy.** See the substantives.

**THEORI**, θεωρη, in *Antiquity*, an appellation given to those Athenians who performed the solemnity called *theoria*.

**THEORIA**, θεωρη, a solemn annual voyage to Apollo's temple, in the island of Delos, performed by the Athenians always in the same ship in which Theseus went. For the particularities of this naval procession, see Potter Archæol. Græc. lib. ii. cap. 9. tom. i. p. 284, seq.

**THEORIC MONEY**, in *Ancient Authors*, was what was raised, by way of tax on the people, to defray the expences of theatrical representations, and other spectacles.

There were particular questors and treasurers of the theoric money. By a law of Eubulus, it was made a capital crime to pervert the theoric money to any other use; even to employ it in the occasions of war.

**THEORICAL ASTRONOMY**, is that part of astronomy which considers the true structure and disposition of the heavens, and heavenly bodies; and accounts for their various phenomena therefrom. See ASTRONOMY.

It is thus called, in opposition to that part which considers their apparent structure, or their disposition as viewed by the eye, which is called *spherical* astronomy.

The several parts of theoretical astronomy, see under SYSTEM, SUN, STAR, PLANET, EARTH, MOON, SATELLITE, and COMET.

**THEORY**, a doctrine which terminates in the sole speculation, or consideration, of its object, without any view to the practice or application of it.

To be learned in an art, &c. the theory suffices; to be a master of it, both the theory and practice are required. Machines, many times, promise very well in the theory, yet fail in the practice.

We say, theory of the moon, theory of the rainbow, of the microscope, the camera obscura, the motion of the heart, the operation of purgatives, &c.

**THEORIES of the Planets, &c.** are systems or hypotheses, according to which the astronomers explain the reasons of the phenomena or appearances of them. See SYSTEM.

**THEORY**, in *Music*, in the hands of a mere mathematician is confined only to ratios and the philosophy of sound. (See HARMONICS.) But among *practical* musicians, the theory of harmony or composition is connected with the combination of agreeable sounds, and the practice and performance of real music.

**THEORY, Atomic**, in *Chemistry*, the means of explaining

the composition and decomposition of chemical bodies, by considering their ultimate atoms or particles as peculiar and distinct elementary solids, never changing in their figure, weight, or volume, under any circumstances.

It would be difficult to conceive the existence of any compound, without supposing it to have originated by union, in some way or other, of particles of its elementary constituents: but the prevalence of a doctrine, which has been generally advanced by mathematicians, *viz.* the infinite divisibility of matter, has never allowed philosophers to conclude that the circumstance of compounds being made up of particles, must necessarily limit the proportions in which the elements combine. If the elementary bodies be conceived infinitely divisible, the molecules, or compound particles, may be conceived infinitely small, and the number of mean compounds existing between any two given extremes may be also considered infinite.

If such were the nature of elementary matter, and no other causes interfered, there could be no limitation to the proportions in which simple matter would combine. This, however, is contrary to fact; as it is a fact known from the earliest dawnings of chemical knowledge, that bodies are limited in the proportions of their elements; the most striking of these facts being the mutual saturation which takes place between an acid and an alkali, and the uniform proportions afforded in the analysis of many native compounds.

Philosophers were always satisfied to consider this fact of the limitation of the proportions of bodies as one of the hidden secrets of nature, as difficult to conceive as the nature of the attraction by which their elements were held together. Berthollet appears to have been the first to attempt this arduous task, in his ingenious work, entitled "Chemical Statics." He supposes that the particles of bodies, when brought within the sphere of attraction, combine without controul till the compound assumes some definite form, by which it is withdrawn from the situation in which it was formed. He supposes the chemical affinity of bodies to be distinct from that power on which their cohesion depends, and also that power by which they tend to an elastic state.

Hence he concludes, that every solid compound is determined by the cohesion which takes place at some limit in the proportion of its elements: such he supposes to be the case with salts and other crystallizable compounds. On the other hand, he supposes the limitations of the proportions of the elements of gaseous compounds to arise from the elastic form which they assume in certain stages of combination. This hypothesis was supported by so many striking facts, that it was thought by some to explain in general the cause of limited proportions. All agreed, that whatever might be the true theory, the causes pointed out by Berthollet had considerable influence in the composition and decomposition of bodies, but they saw at the same time numerous cases in which this hypothesis failed to explain the facts.

Chemists have, from the earliest times, been acquainted with those points of limitation which we call mutual saturation, and have been long familiar with those limited augmentations of their proportions, called by some doses and by others particles. Among the oxyds of metals, which had been little examined before the time of Lavoisier, it was found, that instead of having an infinite number of means between the lowest and highest stages of oxydation, only a certain number of oxyds of each metal could be formed, in which the ratio of the metal to the oxygen is uniform. Many of the salts in the same way are formed by limited doses of acid. Some of the facts in the latter have been explained on Berthollet's hypothesis, while its application

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to the former facts is totally insufficient. Long previous to the true cause of these limited doses, the facts were so conspicuous, that a decided nomenclature was adopted for the purpose of expressing these different stages of combination. The oxyds have been distinguished by the Greek numerals *prot*, *deut*, *trit*, &c. The salts containing two doses of acid have been called *super-salts*; and those containing an extra dose of base, have been called *sub-salts*.

Although chemists have frequently used a language which appeared to shew their acquaintance with the real cause of the definite proportions, such as one compound being formed by one proportion, dose, or particle of one of its elements, and another with two proportions, doses, or particles; on the other hand, we find expressions which would favour the idea of indefinite proportions; such as bodies losing a small portion of their oxygen, or absorbing a little oxygen from the atmosphere. Salts are sometimes said to contain a slight excess of acid, or a small excess of base.

The most decided language used in any chemical work before the discoveries of Mr. John Dalton, giving any idea that the doses are limited by distinct atoms, will be found in a work by Mr. Higgins, entitled "A Comparative View of the Phlogistic and Antiphlogistic Theories." We beg leave to correct a mistake in a former article, in which we have entitled this work a Treatise on Phlogiston.

This work was written for the express purpose of combatting the phlogistic theory, and principally in answer to Mr. Kirwan's treatise of phlogiston. In order to shew the contradictions and absurdities of the phlogistic doctrine, which, under the name of phlogiston, confounded a number of bodies which were very different, he exhibited by diagrams a number of chemical operations, in which he supposed the elementary bodies concerned to be ultimate particles, and their immediate compounds molecules. He in the same diagrams also used numbers, which he supposed to be estimates of the strength of affinity of the combining particles. By this means he very successfully shewed many of the inconsistencies which must be admitted to explain the phenomena on the phlogistic theory. In this mode of proceeding, however, the numbers expressing the relative attractions, served his purpose much more than the consideration of the proportions being caused by distinct atoms; and the language which would induce the belief that he had such a conception of the nature of elementary matter, occurs only in a very few parts of his work.

After concluding that it is unnecessary to admit the existence of the imaginary substance phlogiston in sulphur, he concludes, in page 36, that sulphurous acid is compounded of one ultimate particle of sulphur with one of oxygen, and that sulphuric acid consists of one of sulphur and two of oxygen.

In the same page he also observes, that water is formed by one ultimate particle of water united to one of oxygen.

In page 81, he supposes sulphuretted hydrogen to consist of nine ultimate particles of sulphur with five of hydrogen. Previous, however, to this conclusion, he believes that the sulphur and hydrogen are not chemically combined, but that the sulphur is dissolved in hydrogen, as a salt dissolves in water.

After using arguments to shew, in answer to Mr. Kirwan, that the nitric acid does not contain what was thought to be phlogiston, he concludes, in page 132, with giving what he conceives to be its constituents, *viz.* that the nitrous oxyd consists of one ultimate particle of azote and one of oxygen; nitrous gas, of one of azote and two of oxygen; red nitrous vapour, one of azote and three of oxygen; straw-

coloured nitrous acid, one of azote to four of oxygen; and lastly, that the nitric acid is constituted by one of azote and five of oxygen. These facts are certainly very remarkable, as they agree with the conclusions in the present time, and give a strong proof of Mr. Higgins's genius at the time he wrote.

He does not, however, lay any stress upon these remarks, and was not probably aware that they would be confirmed by future research. We are induced to think so, from the manner in which he expresses himself in other parts of his work, in which he frequently speaks of the absorption of small portions of oxygen, and of bodies having a small portion of oxygen more than they can retain. This vague manner of speaking, and others which we do not immediately recollect, is sufficient to shew that Mr. Higgins had no fixed notions of the cause of definite proportions, and that the language in which he has used the words ultimate particles and molecules, was employed rather with a view to illustrate his examples, than to broach any new theory to explain indefinite proportions. Indeed it would have been inconsistent to have treated two subjects, so very different in their objects, in the same pages.

As a proof that there was nothing striking in the remarks in which the words ultimate atoms and molecules are mentioned, we only need refer to the article which Mr. Higgins himself quotes from the Analytical Review, written soon after the appearance of the work in question. The reviewer gives him the highest praise for the able manner in which he has refuted the doctrine of phlogiston, but does not even hint at his diagrams or the ultimate particles. Indeed we can venture to assert, that if no more had been said on the subject of definite proportions than is to be found in this work, we might yet have been as much in the dark as we were twenty years after the publication of Mr. Higgins's "Comparative View."

It was not enough to know that compound bodies were formed of particles, to enable us to explain the cause of definite proportions; and we want no greater proof of this, than the fact of the true cause not being known till twenty-eight years after Mr. Higgins had told us that one particle of sulphur and one of oxygen formed sulphurous acid, and that one to two formed sulphuric acid. These loose expressions were but a small step indeed towards the discovery of the atomic theory in its present form, which has placed chemistry on the same ground with that on which the discovery of the laws of gravity placed the science of astronomy.

We are inclined to believe that the first step towards this important discovery was given by Richter. He found, in the double decomposition of salts, that the acid of one salt was always just sufficient to saturate the base of the other, and *vice versa*. He also ascertained, that when one metal was precipitated by another, the oxygen of the precipitated metal was just what was required by the precipitating metal.

The inference to be drawn from these facts was, that if A combine with  $x$  to saturation, and B with  $y$  to the same; then, if A should be found to saturate  $y$ , B would also saturate  $x$ . This inference may be still further extended; for if A be a body capable of combining with B, they will mutually saturate each other.

It is the means of drawing these inferences arising from the mutual fitness of those parts of bodies which combine, that constitutes the importance of the atomic theory, and it is for the establishment of this new principle that we are indebted to Mr. John Dalton. When Mr. Higgins can shew, from the data given in his work, that similar infer-

ences

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ences could be drawn, he then will be entitled to share in the merit of the discovery of the atomic theory. We say share with him, for we are firmly convinced that Mr. Dalton had never read Mr. Higgins's book previous to the publication of his own work.

We perfectly recollect the time, not more than four or five years ago, even when Mr. Dalton's book was before the public, very few chemists understood the true spirit of the atomic theory; and those who conceived they did understand it, in general discarded it. All knew that he considered compounds to be formed of atoms united 1 to 1, 1 to 2, 1 to 3, &c.: but it was not till the reciprocal fitness of these atoms with each other was found to agree with analysis, that it was generally received. When they saw that the numbers, which Dalton called the weights of the atoms, expressed the simple proportions in which bodies combine, they knew it could not be the effect of chance, and have willingly joined in the research. It is for this part of the discovery that Mr. Dalton justly merits the fame he has acquired.

We have given all the facts on which Mr. Higgins could possibly found his claim to the discovery; and we must leave it to our readers to judge, whether they contain the smallest data on which to establish what in the present time we call the atomic theory.

In all the chemical articles since the article IRON, we have had the greatest confidence in the atomic theory; and we have never failed to compare the analyses of different authorities with the results given by theory. We have in general found, that these results have been nearer to the best of these authorities, than they have been to each other.

We have already given an outline of the atomic theory, with a table of the weights of the simple atoms, and another of some of the most conspicuous compounds, in our articles *Definite Proportions*, and *Simple Bodies*.

The French chemists have adopted the atomic theory under another form, which will be found to agree with the language given by Berzelius, who uses the word *volume* for atom, as we have already explained in the article above alluded to.

Gay Lussac several years ago published a new law respecting the combination of gaseous bodies. He held that gases which combine chemically, either unite in equal volumes, or 1 to 2, or some multiple of 1, by a whole number. Although a number of facts seemed to agree with this law, the truth of it was doubted by some chemists, and principally because no apparent reason appeared for such a law.

In stating (under the article *Proportions*) the notion of Berzelius respecting volumes, we have pointed out a curious coincidence between the specific gravity and the weight of atoms of the gases, which has since been confirmed by Dr. Prout in *Dr. Thomson's Annals*. In order that the weights of the atoms may be equal to their specific gravities, we have there stated, that the number of particles in equal volumes of all gases must be equal, and the distance between the centres of the particles of all gases the same, so that the weights of equal volumes of different gases, would be as the weights of the atoms.

This would also require, that the attraction between the particles should either be the same in all, or that it should be nothing; and the distance of the particles be at points where the repulsion of the caloric atmosphere is balanced by the incumbent pressure.

The state here supposed, however, is not the case, since we find that the weights of the atoms of the gases generally are not equal to the specific gravity, when reduced to

the same standard, although it is strictly the case with a great proportion of them. And in those cases where they are not equal, the one is said to be some multiple of the other, by a whole number.

This circumstance favours the hope that some general law exists, by which the weights of the atoms of bodies are intimately connected with their specific gravities in the elastic form. When the specific gravity is double the weight of the atom, as is the case with oxygen, we have to suppose, that the particles are nearer each other in the proportion of 2 to 1, or that two particles come together, and are surrounded by the caloric, which belongs to one of them in their single state.

It would appear that the oxygen puts on this single state of existence in the formation of carbonic oxyd, because that gaseous body contains only one atom of oxygen; hence its specific gravity is the same as if it were formed from a gaseous oxygen of half the real specific gravity united to an atom of carbon without any change of volume, the same as takes place when sulphur or carbon is burned in oxygen gas. Hence we may explain the great tendency that oxygen has to combine in double doses with bodies, as is the case with carbon, sulphur, phosphorus, iron, and many other bodies.

We have also an instance of a compound gaseous body becoming of double the specific gravity which would be expected in olefiant gas, which is composed of an atom of carbon and an atom of hydrogen. The specific gravity (hydrogen being 1) ought to be  $1 + 5.4 = 6.4$ ; but in fact it is about the double of this. Hence we should conclude, that the repulsion between the particles is halved, or that the compound atoms have united in pairs, by which the density is doubled.

*Theory of the Manufacture and Production of Bread, in Rural Economy*, the explanation of the principles and practices on which it depends in different cases. The means which are employed in such cases are mostly well understood; but the principles upon which they depend are far from being so well known. The writer of a late work on the "Elements of Agricultural Chemistry," has, however, thrown some light on this hitherto intricate subject. He has noticed, that a number of the changes taking place in the vegetable principles, depend upon the separation of oxygen and hydrogen as water from the compound; but that there is one of very great importance, in which a new combination of the elements of water is the principal operation: this is in the manufacture of bread. When any kind of flour, which consists principally of starch, is made into a paste with water, and immediately and gradually heated to about 440°, it increases, it is said, in weight, and is found entirely altered in its properties; it has lost its solubility in water, and its power of being converted into sugar. In this state it is unleavened bread.

And when the flour of corn, or the starch of potatoes, mixed with boiled roots of the same kind, is made into a paste with water, kept warm, and suffered to remain thirty or forty hours, it ferments, carbonic acid gas is disengaged from it, and it becomes filled with globules of elastic fluid. In this state it is raised dough, and affords by baking leavened bread; but this bread, it is said, is sour and disagreeable to the taste; and that leavened bread for use is made by mixing a little dough that has fermented, with new dough, and kneading them together, or by kneading the materials for the bread with a small quantity of yeast.

It is stated, that in the formation of wheat bread, more than one-fourth of the elements of water combine with the flour;

flour; that more water in proportion is consolidated in the formation of bread from barley, and still a larger quantity in that from oats; but that the gluten in wheat, being in much larger quantity than in other grain, seems to form a combination with the starch and water, which renders wheaten bread more digestible than other species or kinds of bread.

On this principle too it is probable, that this sort of bread may be more suitable and proper for the less laborious classes of society, though the other kinds may be equally or more nourishing and lasting for those who are engaged in hard work.

**THEOSOPHISTS**, the denomination of a class of philosophers, who profess to derive their knowledge of nature from divine revelation. Not contented with the natural light of human reason, nor with the simple doctrines of scripture understood in their literal sense, these persons have recourse to an internal supernatural light, superior to all other illuminations, from which they pretend to derive a mysterious and divine philosophy, manifested only to the chosen favourites of heaven. They boast, that, by means of this celestial light, they are not only admitted to the intimate knowledge of God, and of all divine truth, but have access to the most sublime secrets of nature. They ascribe it to the singular manifestation of divine benevolence, that they are able to make such an use of the element of fire, in the chemical art, as enables them to discover the essential principle of bodies, and to disclose stupendous mysteries in the physical world. (See *FIRE Philosophers*.) They even pretend to an acquaintance with those celestial beings, which form the medium of intercourse between God and man, and to a power of obtaining from them, by the aid of magic, astrology, and other similar arts, various kinds of information and assistance. This they affirm to have been the ancient secret wisdom, first revealed to the Jews under the name of Cabbala, and transmitted by tradition to posterity. Philosophers of this class have no common system; but every one follows the impulse of his own imagination, and constructs an edifice of fanaticism for himself. They only agree in abandoning human reason, and pretending to divine illumination. Many traces of the spirit of Theosophism are to be found in the whole history of philosophy, in which fanatical and hypocritical pretensions to divine illumination frequently occur. Among moderns, the first name that is mentioned with any distinction in this class of philosophers is Paracelsus. (See his biographical article.) He was succeeded by Robert Fludd, who compounded into a new mass of absurdity all the mysterious and incomprehensible dreams of the Cabbalists and Paracelsians. He supposed two universal principles, the northern or condensing power, and the southern or rarefying power; and over these he placed innumerable intelligences and geniuses, and called together whole troops of spirits from the four winds, to which he committed the charge of diseases. (See his article.) Another dazzling luminary in the constellation of Theosophists was Jacob Boehmen. See **BEHMEN**.

A more scientific Theosophist than Boehmen was Van Helmont. (See **HELMONT**.) The most elegant and philosophical of all the Theosophists was Peter Poiret, who was born at Metz in the year 1646, and educated in the academy of Basil. In 1668 he became a student in the university of Heidelberg, with a view of qualifying himself for the clerical profession, and in 1672 he assumed the character of an ecclesiastic in the principality of Deux-Ponts. After a severe fit of illness, he wrote his "Cogitationes Rationales de Deo, Anima, et Malo," in which he mostly followed the principles of Des Cartes, having in his youth studied the

Cartesian philosophy; a work which he defended against the censures of Bayle. Being obliged by the public tumults to withdraw from his clerical cure, he removed to Holland, and afterwards to Hamburg, where he became acquainted with the celebrated mystic Mad. Bourignon, and enlisted himself in the number of her disciples. Abandoning Cartesianism, and fascinated with Bourignonian mysticism, he rejected the light of reason as useless and dangerous, and inveighed against every kind of philosophy that was not the effect of divine illumination. Towards the close of his life he settled at Rheinsburg, in Holland, and employed himself in writing mystical books; such were his treatises "De Oeconomia Divina," "De Eruditione Triplici," and the last edition of his "Cogitationes Rationales." He died in the year 1719. Some of his mystical notions may be collected from the preliminary dissertation prefixed to his works; they are such as these: "It hath pleased God, in order that he may enjoy a vivid and delightful contemplation of himself, beyond that solitude which belongs to the divine essence, to create external beings in whom he may produce an image of himself. The essence of the human mind is 'thought,' capable and desirous of light, and joyful complacence; the properties in which it bears a resemblance of the divine essence. Nothing is more intimate or essential to the mind than this desire; by which it is borne always towards the true and infinite good. In order to satisfy this desire, the illumination of faith is necessary; by means of which the mind, conscious of its weakness and impotence, disclaims all the fictions of human reason, and directs itself towards God with an intense and ineffable ardour, till, by the silent contemplation of him, it is filled with tranquillizing light and joyful complacence; although, whilst oppressed with the load of mortality, it cannot behold his unveiled face. From this divine illumination proceeds the most pacific serenity of mind, the most ardent love of God, and the most intimate union with him."

To the class of Theosophists it has been usual to refer the entire society of *Rosycrucians*; which see.

It will be sufficient to observe, at the close of this article, that the whole system of Theosophism is founded in delusion, and that it is injurious both to philosophy and religion. These supposed illuminations are to be ascribed either to fanaticism or to imposture. The fastidious contempt, with which these pretenders to divine wisdom have treated those who are contented to follow the plain dictates of common sense, and the simple doctrine of scriptures, has unquestionably imposed upon the credulous vulgar, and produced an indifference to rational enquiry, which has obstructed the progress of knowledge. And their example has encouraged others to traduce philosophy and theology in general, by representing them as resting upon no better foundation than enthusiasm and absurdity. It is to be charitably presumed, that these deluded visionaries have not been themselves aware of the injury which they have been doing to the interests of science and religion. Nevertheless, it must be regretted, both on their own account, and on account of the multitudes they have misled, that whilst they have thought themselves following a bright and steady luminary, they have been led astray by wandering meteors. Brucker by Enfield.

**THEOTOCUS**, *DEIPARA*. See *MOTHER of God*.

**THEOXENIA**, *Θεοξενια*, in *Antiquity*, a festival in honour of all the gods, and celebrated in many cities of Greece, but especially Athens.

**THEOXINI MALAGMA**, the name of a sort of cataplasm, good against pains of the feet.

**THERA**, in *Ancient Geography*, one of the islands called

*Sporades*, in the Ægean sea, between the island of Crete and the Cyclades. It is said to have taken its name from Theras, a prince of the race of Cadmus, who removed from Lacedæmon into this island, which was occupied by the descendants of the Memblariani, who had possession of it 1550 years before our era; whereas Pliny says that it first appeared in the fourth year of the 135th olympiad. This island is now called *Santorin*; which see.—Also, a town of the island of the same name.—Also, a town of Asia Minor, in Caria, between Idymus and Pyltus.—Also, a town of Asia, in Sogdiana.

THERAMBUS, a town of Macedonia, in the peninsula of Pallene.

THERAMNÆ, a town of Asia Minor, in Lycia; consecrated to Apollo.

THERAPEUTÆ, *θεραπευται*, a Greek term signifying servants, more especially those employed in the service of God. The Greeks gave the appellation *therapeutæ* to such as applied themselves to a contemplative life, whether it were from the great concern they had for their souls, or from the particular mode and manner of their religion; the word *θεραπευσις*, whence *therapeutæ*, signifying the care a physician takes of his patient, or the service any one renders another.

Philo, in his first book of the *Contemplative Life*, relates, that there were a people spread throughout most of the known world, but particularly throughout Egypt, and about Alexandria, who renounced their friends, their goods, &c. and who, after discharging themselves of all temporal concerns, retired into solitary places, where they had each their separate mansion, called *semnium*, or *monastery*, and placed their whole felicity in the contemplation of the divine nature.

The principal society of this kind was formed near Alexandria, where they lived, not far from each other, in separate cottages, each of which had its own sacred apartment, to which the inhabitant retired for the purposes of devotion. After their morning prayers, they spent the day in studying the law and the prophets, endeavouring, by the commentaries of their ancestors, to discover some allegorical meaning in every part. They also amused themselves with composing sacred hymns in various kinds of metre. Six days of the week were thus passed in solitude. On the seventh day they met, decently clothed, in a public assembly, where, seated according to their age, they held the right hand between the breast and the chin, and the left at the side. Then one of the elders, stepping to the middle of the assembly, discoursed, gravely and calmly, on the doctrines of the sect; the audience remaining silent and occasionally expressing their approbation by a nod. The chapel in which they assembled was separated into two apartments, one for the men, the other for the women. At the close, the speaker sung a hymn of praise to God, in the last verse of which the whole assembly joined. On great festivals, sacred music was performed, accompanied with solemn dancing; and these vigils were continued till morning, when the assembly, after a morning prayer, in which their faces were directed towards the rising sun, was broken up. Such was their abstemiousness, that they commonly ate nothing before the setting sun, and often fasted two or three days. They wholly abstained from wine, and their ordinary food was bread and herbs.

There are two points relating to these *therapeutæ* exceedingly controverted among critics, *viz.* 1. Whether they were Jews or Christians; and, 2. If they were the latter, whether they were monks or seculars?

Mosheim affirms, that the *therapeutæ* were neither Chris-

tians nor Egyptians, as some have erroneously imagined: they were undoubtedly Jews; nay, they gloried in that title, and styled themselves, with particular affectation, the true disciples of Moses, though their manner of life was equally repugnant to the institutions of that great lawgiver, and to the dictates of right reason, and shewed them to be a tribe of melancholy and wrong-headed enthusiasts.

Calmet also, in his Dictionary of the Bible, alleges a variety of reasons to prove, that the *therapeutæ* were Jews and not Christians; and that they were not monks in the sense which ecclesiastical writers affix to this term. Some have imagined that they were judaizing Gentiles; but Philo, by classing them with the Essenes, evidently supposes them to be Jews. Others have maintained, that they were an Alexandrian sect of Jewish converts to the Christian faith, who devoted themselves to a monastic life. But this is impossible; for Philo, who wrote before Christianity appeared in Egypt, speaks of this as an established sect. From a comparison of Philo's account of this sect with the state of philosophy in the country where it flourished, we may reasonably conclude, that the *therapeutæ* were a body of Jewish fanatics, who suffered themselves to be drawn aside from the simplicity of their ancient religion by the example of the Egyptians and Pythagoreans. It is uncertain how long this sect continued; but it is thought not improbable, that, after the appearance of Christianity in Egypt, it soon became extinct. See *ESSENES*.

THERAPEUTICE, THERAPEUTICS, *θεραπευτικη*, formed from *θεραπευσις*, to attend, to nurse, cure, &c. that part of medicine which is employed in seeking out remedies against diseases, and in prescribing and applying them to effect a cure.

Therapeutice teaches the use of diet, pharmacy, surgery, and the *methodus medendi*.

THERAPEUTICÆ is also used figuratively, in speaking of the mind, and of discourses made to correct the errors and defects of it.

Such is the Therapeutice or Therapeutics of Theodoret; being a treatise against the errors of unwholesome opinions of the Greeks, *i. e.* the heathens.

THERAPHIM, or TERAPHIM, an Hebrew term, which has given great exercise to the critics. We meet with it thirteen or fourteen times in Scripture, where it is commonly interpreted *idols*: but the rabbins are not contented to have them simply signify idols, but will have it denote a peculiar sort of idols or images intended for the knowledge of futurity, *i. e.* oracles.

R. David de Pomis observes, that they were called *theraphim*, from *רפח*, *raphah*, to leave, because people quitted every thing to consult them.

Others hold, that the *theraphim* were brazen instruments which pointed out the hours and minutes of future events, as directed by the stars.

R. Eliezer tells us the reason why the rabbins will have the *theraphim* to speak, and render oracles: it is, says he, because it is written in the prophet Zechariah, x. 2. "The *theraphim* have spoken vain things."

The same rabbin adds, that to make the *theraphim*, they killed a first-born child, clove his head, and seasoned it with salt and oil: that they wrote on a plate of gold the name of some impure spirit, laid it under the tongue of the dead, placed the head against the wall, lighted lamps before it, and prayed to it, and that it then talked with them.

Vorslius also observes, that, beside the passage of Zechariah, just quoted, it appears likewise from Ezekiel, xxi. 21. that the *theraphim* were consulted as oracles.

F. Kircher directs us to seek the origin of the *theraphim*

in Egypt; adding, that the word is Egyptian. Spencer, in his dissertation on the *urim* and *thummim*, maintains the word to be Chaldec, and to signify the same with *seraphim*: the Chaldeans being frequently known to change the  $\psi$  into  $\pi$ , that is *f* into *t*. He adds, that those images were borrowed from the Amorites, Chaldeans, or Syrians; and that the *Serapis* of the Egyptians is the same thing with the *theraphim* of the Chaldeans. See Selden de Diis Syris, synt. i. cap. 2.

Calmet observes, that the figure of a winged serpent, called *seraph*, whence the name *seraphim*, has given rise to the appellation *theraphim*, because in the *abraxas* and other talismans of the ancients, which are real *theraphims*, we find the figures of serpents both with and without wings; whence he infers, that the *theraphims* of Laban, which were stolen by Rachael, were real talismans. Jurieu conjectures, that these *theraphims* were the *penates*, or household gods of Laban, which, he says, were the souls of the heroes of families, deified and worshipped; and he adds, that the *theraphims* of Laban were the images of Noah, the restorer of the human race, and of Shem, the chief of the family of Laban. But Calmet, in reply to this conjecture, observes, that it is by no means credible, that the worship of the *penates* and *lares* was known in the time of Laban; and that it is not likely, that Laban should have ranked among the gods Noah and Shem, who had died so near his own time: for Noah died A.M. 2006, and Shem A.M. 2158, about eighty-seven years before Jacob came to Mesopotamia after Laban.

**THERAPIDION**, in *Botany*, a name given by some authors to the common oyster-green, or sea-laver, a substance of the *tremella* kind.

**THERASIA**, in *Geography*, a small rocky island in the Grecian Archipelago, separated from the N.W. coast of Santorin (the ancient Thera) by a narrow channel, which forms a secure harbour for boats; 3 miles N. of St. Nicolo. Therasia is said by Tournefort and Somini to be the present *Aspronisi* (which see); but Olivier mentions them as distinct islands. Therasia, says this last-mentioned traveller, on which Ptolemy places a town, and which Pliny conjectures, with reason, to have been detached from Thera, cannot be taken for *Aspronisi*, nor the latter for the former, as Tournefort imagines. *Aspronisi* is not large enough to have had upon it the smallest village, or the smallest habitation; whereas Therasia has sufficient extent, and its territory is sufficiently good, to have been always the site of a town, as one is still to be seen there at the present day.

**THERESA**, a river of Africa, which runs into the Atlantic, S. lat. 13°.

**THERESA**, *Order of Maria*, a military order instituted by the empress-queen in Germany, on the 18th of June, 1757, and composed of two classes, *viz.* grand crosses and knights. To these the emperor Joseph II., in the year 1765, added an intermediate class, under the appellation of commanders. The number of knights is not fixed, and the emperor is grand-master. The badge of the order is, "a cross of gold, enamelled white, edged with gold;" on the centre are the arms of Austria, *viz.* "gules, a fesse-argent, encircled with the word *Fortitudini*;" on the reverse is "a cipher of the letters M. L. F. in gold, on an enamelled green ground." The badge is worn pendant to a striped crimson and white ribbon.

**THERGUBIS**, in *Ancient Geography*, a town of Asia, in the interior of Mesopotamia, situated on the bank and towards the source of the river Chaborras.

**THERIACA**,  $\Theta\eta\rho\rho\iota\alpha\kappa\alpha$ , *Treacle*, in *Medicine*, a name given by the ancients to various compositions esteemed good

against poisons; but afterwards chiefly restrained to what, by way of distinction, has been called *theriaca Andromachi*, or *Venice treacle*: but now altogether out of use.

This is a compound of no less than sixty-four drugs, prepared, pulverized, and reduced, by means of honey, into an electuary. The basis or foundation of the composition is viper's flesh. M. Charas has written a particular history of the animals, plants, and minerals, which enter the composition of this famed remedy.

It is said to be sovereign against the bites of venomous beasts, and in the wind-colic; and was also used in intermitting fevers, and in cases requiring perspiratives and diaphoretics; also in continual fevers, especially such as are malignant, and where the pulse is low and ticking; and in the small-pox and measles: and, as most of the ingredients of it are very hot, in all diseases where the natural heat is weak and languid.

Andromachus, Nero's physician, passes for the inventor of the *theriaca*; at least, it was he who gave the first description of it in elegiac verses; his son did the same in prose, and Damocrates in iambics.

Anciently, the treacle made at Venice had all the vogue: and many still retain the ancient prejudice; but it has been since prepared at Montpellier, at Paris, and at London, with as much advantage as at Venice.

There is another vulgar kind of *theriaca*, called *diateffaron*, because it only consists of four ingredients.

Treacle-water and treacle-vinegar are found good preservatives against putrid air, whether by only being smelt at, or by rubbing the wrists, temples, and nose with them.

**THERIACA Russicorum**, a name given to garlic, from its use as an antidote against the contagion of pestilential and other putrid disorders.

**THERIOMA**, from  $\theta\eta\rho\rho\iota\alpha$ , *to rage*, in *Surgery*, a malignant ulcer.

**THERMA**, in *Ancient Geography*, a town of Cappadocia, on the route from Tavia to Caesarea, between Tavia and Soanda. Anton. Itin.—Also, a town situated on the confines of Macedonia, or rather of Thessaly, towards Thermopylæ. This town was situated on the gulf called Thermæus, whence its name.

**THERMA Pythia**, baths of Asia Minor, in Bithynia. Propcius mentions this place, and says that Justinian constructed here a bath for public use, and a canal to conduct into it fresh water, and that he also provided others, which indicated a magnificence truly royal.

**THERMÆ**,  $\Theta\eta\rho\rho\alpha\iota$ , in *Architecture*, ancient buildings, furnished with baths, especially of the hot kind.

Among the noblest monuments of ancient Rome, are reckoned the thermæ, or baths of Dioclesian. See **BATHS**.

Thermæ, or hot springs, it is commonly argued, owe heat to a collocation, or effervescence, of the minerals in them. Though Dr. Woodward ascribes it to the subterraneous heat, or fire, which communicates with them by some spiracle, or canal, whereby a greater quantity of heat is derived thither, than to ordinary springs. See **BATH**.

**THERMÆ**, in *Ancient Geography*, a place on the southern coast of Sicily. Pliny denominates this place a Roman colony; and Antonine calls the sources of the hot water which gave the name of Thermæ to this place "Aquæ Larodæ." There were also baths at Selinonti in Sicily, called Thermæ Selinuntia. The name *thermæ* was also given to those highly saline warm waters that were found in the neighbourhood of Corinth.

**THERMÆUS SINUS**, a gulf of the Ægean sea, on the coast of Macedonia.

**THERMASMA**, a word used by some of the ancients

to express any thing that warms the body, and by others particularly for a warm fomentation, prescribed by Hippocrates for removing pains in the side, and giving ease in pleuritis.

**THERMES**, in *Ancient Geography*, a town of Hispania Citerior, S. of Numantia.

**THERMI**, in *Geography*, a town of Asiatic Turkey, in the province of Natolia; 24 miles N. of Burfa.

**THERMIA**, an island in the Grecian Archipelago, so called from its abounding with hot springs. It is not so mountainous as some of the other islands, and the soil, when well cultivated, produces very large quantities of barley, wine, and figs. The island also affords plenty of honey, wax, partridges, a great quantity of fine silk, and as much cotton as the inhabitants require for their own use. The Greek Christians in this island are computed at 16,000. Thermia is the see of a bishop, and contains fifteen or sixteen churches, and several convents. On the island are still visible the ruins of two cities; one of which, on the fourth coast, must have been of extraordinary splendour. N. lat.  $37^{\circ} 20'$ . E. long.  $24^{\circ} 32'$ .

**THERMIA**, a town and capital of the island of Thermia. N. lat.  $37^{\circ} 24'$ . E. long.  $24^{\circ} 26'$ .

**THERMOMETER**, **THERMOMETRUM**, derived from  $\theta\epsilon\rho\mu\omicron\varsigma$ , *heat*, and  $\mu\epsilon\tau\rho\epsilon\nu$ , *to measure*, an instrument shewing, or rather measuring, the increase and decrease of the heat and cold of the air.

The degree of heat, as ascertained by a thermometer, is only to be considered in relation to the surrounding bodies, by virtue of which a body supports the equilibrium of temperature, when it is in the neighbourhood of bodies equally heated: thus, if a thermometer stands at  $60^{\circ}$ , both in a vessel of water and in another of mercury, we may infer that the water and the mercury may be mixed without any change of their temperature; but the absolute quantity of heat contained in equal weights, or in equal bulks, of any two bodies at the same temperature, is by no means the same. See **HEAT**.

The general principles upon which the construction and use of thermometers, or measurers of heat depend, are stated and explained under the articles **CALORIC**, **COLD**, **CONGELATION**, **FREEZING**, **HEAT**, &c.

It will be sufficient to observe in this place, that the well-known and most general effect of heat, whether it be obtained by compressing a certain substance into a narrower space, so that a quantity of heat may come out of it and be communicated to certain bodies, or by expanding a certain substance into a larger space, so that it may absorb a quantity of heat from surrounding bodies, and thus cool these bodies, or in whatever other way it be procured, is a dilatation of bodies, or an augmentation of their bulks. The contrary effect is produced by cold, *i. e.* by a diminution of the free caloric. It must, however, be observed, that bodies of equal bulks, but of different kinds, are not expanded alike by being heated to the same degree; nor are the increments of bulk in the same body always proportional to the quantities of heat which are communicated to it. *E. gr.* if a given quantity of water, by being heated to a certain degree, be increased in bulk one cubic inch, the addition of double or treble that quantity of heat will not increase its bulk two or three cubic inches respectively; therefore the expansions of water are not proportional to the increments of heat.

The only practicable method of measuring the expansions of fluids, is by inclosing them in certain vessels, and by measuring that part of the cavity of each vessel which is occupied by the particular fluid which fills it in different temperatures.

It is evident, that the substance of the vessel is also expanded by the heat, and of course its cavity is enlarged. Therefore, when we find that the bulk of the fluid is increased, that apparent increment is only the difference between the enlarged capacity of the vessel and the increased bulk of the fluid. For this reason those vessels must be made of such substances as are least expansible by heat. Indeed glass is the substance which is universally used for such purposes, both on account of its little expansibility, and of its transparency, besides its having other remarkably useful properties.

A glass vessel filled to a certain degree with a liquid, for the purpose of shewing the expansion of that liquid in different temperatures, or for the purpose of shewing the temperature by the corresponding expansion of that liquid, is called a *thermometer*.

The thermometer and thermoscope are ordinarily accounted the same thing: Wolfius, however, makes a difference; but shews, at the same time, that what we call thermometers are, in reality, no more than thermoscopes.

The invention of the thermometer is attributed to several persons by different authors, *viz.* to Sanctorio, Galileo, Father Paul, and Drebbel. The invention is ascribed to Cornelius Drebbel of Alcmær, about the beginning of the seventeenth century, by his countrymen Boerhaave (*Chem. i. p. 152. 156.*) and Muschenbroeck, *Introd. ad Phil. Nat. vol. ii. p. 625.*

Fulgenzio, in his life of Father Paul, gives him the honour of the first discovery. Vincenzio Viviani (*Vit. de l'Galil. p. 67.* See too *Oper. di Galil. pref. p. 47.*) speaks of Galileo as the inventor of thermometers. But Sanctorio himself (*Com. in Galen. Art. Med. p. 736—842. Com. in Avicen. Can. Fen. i. p. 22. 78. 219.*) expressly assumes this invention; and Borelli (*De Mot. Animal. ii. prop. 175.*) and Malpighi (*Oper. Polth. p. 30.*) ascribe it to him without reserve. Upon which Dr. Martine remarks, that these Florentine academicians are not to be suspected of partiality in favour of one of the Patavinian school. But whoever was the first inventor of this instrument, it was very rude and imperfect; and as the various degrees of heat were indicated by the different contraction or expansion of air, it was afterwards found to be an uncertain and sometimes a deceiving measure of heat, because the bulk of air was affected, not only by the difference of heat, but likewise by the variable weight of the atmosphere.

There are various kinds of thermometers; the construction, defects, theory, &c. of which, are as follow:

*Construction of the Thermometer, depending on the Rarefaction of the Air.*—This aerial thermometer, which was that first invented by Drebbel, consists of a glass tube B E (*Plate XVI. Pneumatics, fig. 1.*), connected at one end with a large glass ball A, and at the other end immersed in an open vessel, or terminating in a ball D E, with a narrow orifice at D; which vessel, or ball, contains any coloured liquor that will not easily freeze. Aqua fortis tinged of a fine blue colour with solution of vitriol or copper, or spirit of wine tinged with cochineal, or Brasil wood, will answer this purpose. But the ball, A, must be first moderately warmed, so that a part of the air contained in it may be expelled through the orifice D; and then the liquor pressed by the weight of the atmosphere will enter the ball D E, and rise, *e. g.* to the middle of the tube at C, at a mean temperature of the weather; and in this state the liquor by its weight, and the air included in the ball A, &c. by its elasticity, will counterbalance the weight of the atmosphere. As the surrounding air becomes warmer, the air in the ball and upper part of the tube, expanding by heat, will drive the liquor into the

lower

## THERMOMETER.

lower ball, and consequently its surface will descend; on the contrary, as the ambient air becomes colder, that in the ball is condensed, and the liquor pressed by the weight of the atmosphere will ascend: so that the liquor in the tube will ascend or descend more or less, according to the state of the air contiguous to the instrument. To the tube is affixed a scale of the same length, divided upwards and downwards from the middle, C, into one hundred equal parts, by means of which the ascent and descent of the liquor in the tube, and consequently the variations in the cold or heat of the atmosphere, may be observed.

It must be acknowledged, that the expansion of elastic fluids affords, in some cases, a test of heat, which is very convenient from its great delicacy, and because a very small quantity of heat is sufficient to raise their temperature very considerably.

A similar thermometer may be constructed by putting a small quantity of mercury, not exceeding the bulk of a pea, into the tube B C (*fig. 2.*) thus bent in wreaths, that taking up the less height, it may be the more manageable and less liable to harm; divide this tube into any number of equal parts to serve for a scale.

Here the approaches of the mercury towards the ball, A, will shew the increase of the degree of heat. The reason is the same as in the former.

The defect of both these instruments consists in this, that they are liable to be acted on by a double cause: for, not only a decrease of heat, but also an increase of weight of the atmosphere, will make the liquor rise in the one, and the mercury in the other; and, on the contrary, either an increase of heat, or decrease of weight of the atmosphere, will make it descend.

In winter, for example, the liquor would rise and sink too much; for a frost condensing the internal air, the liquor would ascend, but as the air is heavier in frosty weather, its pressure on the liquor in the vessel D E (*fig. 1.*) being increased, would raise the liquor still higher in the tube, and thus indicate a degree of cold greater than it really is. On the other hand; if the weather grows warm, as it does in rainy weather in winter, the air in the ball will expand, and the liquor descend in the tube; but as the weight of the atmosphere is less in foul weather, the liquor in D E will be less pressed than it was, and suffer the liquor to descend more than it should do, and shew a greater degree of warmth than that of the ambient air. The reverse of this will happen in summer: for warm weather being fair weather, and the atmosphere being then heavier than usual, the liquor will be made to stand higher in the tube than it should do, and shew the degree of heat to be less than it really is. And as in summer, the weather becomes cold with rain; but the weight of the atmosphere being diminished, the liquor will not ascend so far as it ought to ascend by the condensation of the internal air, and therefore indicate the cold to be less than it really is: and when the two causes, thus contributing to the rise and fall of the liquor, act equally in opposite directions, the liquor would appear neither to ascend nor descend, whatever might be the changes in the temperature of the atmosphere, on account of equal corresponding variations in its gravity. Besides, the air in the ball, &c. is liable to be affected more or less in its elastic quality by the vapours that detach themselves from the included liquor according to the degree in which it is heated or cooled. For these and other measures, thermometers of this kind have been long diffused.

Instruments of this kind, when they are subject to the variations of the pressure of the atmosphere, as well as to those of its temperature, are properly called manometers,

and require, for enabling us to employ them as thermometers, a comparison with the barometer; while, on the other hand, they may be used as barometers if the temperature be otherwise ascertained. They are, however, very useful without this comparison, in delicate experiments of short duration; besides, the changes of the barometer are seldom very rapid, and they may also be wholly freed from the effects of the pressure of the atmosphere in various ways.

Bernoulli's method consists in closing the tube of a common barometer so as to leave the column of mercury in equilibrium with the air contained in the bulb at its actual temperature, and capable of indicating, by the changes of its height and of its pressure, any subsequent changes in the temperature of the air, which must affect both its bulk and its elasticity. (See *fig. 3.*) Mr. Leslie's photometer, or *Differential THERMOMETER* (which see), has some advantages which render it better than this instrument; but it can only be employed when the changes of the temperature can be confined only to a part of the instrument. The elasticity of the air contained in the bulb is here counteracted, not by the pressure of a column of mercury, but by the elasticity of another portion of air in a second bulb, which is not to be exposed to the heat or cold that is to be examined; and the difference of the temperatures of the two bulbs is indicated by the place of a drop of a liquid, moving freely in the tube which joins them.

M. Amontons, in 1702, with a view of perfecting the *aerial* thermometer, contrived his *universal* thermometer. Finding that the changes produced by heat and cold in the bulk of the air were subject to invincible irregularities, he substituted for these the variations produced by heat in the elastic force of this fluid. This thermometer consisted of a long tube of glass (see *fig. 4.*) open at one end, and recurved at the other end, which terminated in a ball. A certain quantity of air was compressed into this ball by the weight of a column of mercury, and also by the weight of the atmosphere. The effect of heat on this included air was to make it sustain a greater or less weight; and this effect was measured by the variation of the column of mercury in the tube, corrected by that of the barometer, with respect to the changes of the weight of the external air. This instrument, though much more perfect than those in the room of which it was substituted by its inventor, is nevertheless subject to very considerable defects and inconveniences. Its length of four feet renders it unfit for a variety of experiments, and its construction is difficult and complex: it is extremely inconvenient for carriage, as a very small inclination of the tube would suffer the included air to escape: and the friction of the mercury in the tube, and the compressibility of the air, contribute to render the indications of this instrument extremely uncertain. Besides, the dilatation of the air is not so regularly proportional to its heat, nor is its dilatation by a given heat nearly so uniform as he supposed. This depends, as the abbé Nollet has suggested, much on its moisture; for dry air does not expand near so much by a given heat, as air stored with watery particles; which by being converted into steam, very much increase the seeming volume of the air. For these and other reasons enumerated by M. de Luc, (*Récherches sur les Mod. de l'Atm. tom. i. p. 278, &c.*) this instrument was imitated by very few, and never came to be of general use.

*Construction of the Florentine Thermometer.*—The academists del Cimento, about the middle of the seventeenth century, considering the inconveniences of the air-thermometers above described, attempted another, that should measure heat and cold by the rarefaction and condensation of spirit of wine; though much less than those of air, and consequently

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frequently the alterations in the degree of heat likely to be much less sensible.

The spirit of wine was enclosed in glass tubes, hermetically sealed; so that these thermometers could be subject to no inconvenience by the evaporation of the liquor, or the variable gravity of the incumbent atmosphere. Instruments of this kind were first introduced into England by Mr. Boyle, and they were soon universally used among philosophers in other countries. The *Florentine* thermometer consists of a small narrow tube B C D (*fig. 5.*) connected with a glass ball A. The tube should be procured as cylindrical as possible: and it may be tried, by putting into one end of it as much mercury as will fill the length of one inch, and letting this quantity of mercury pass from one part of the tube to another, through its whole length; measure with compasses the length it occupies in every part of the tube; and if it every where takes up an inch, the tube is cylindrical, and a scale of equal divisions will agree with it: otherwise it will be longer where the tube is smaller, and shorter than an inch where the tube is larger; and in this case, the divisions must be suited to the contents of the bore. The glass ball may then be joined to the tube, and a small cavity be made at the other end. Fill the ball and tube with rectified spirit of wine to a convenient height, as to C, when the weather is of a mean temperature, which may be done by inverting the tube into a vessel of stagnant coloured spirit, under a receiver of the air-pump, or by many other ways. The spirit may be coloured by pouring a quantity of it on small pieces of turmeric, which will hereby receive a red tincture; and the spirit may be repeatedly filtrated through brown paper, in order to separate from it the coarser particles of the root. Some persons, in filling the ball and tube, for preventing the spirit from wholly descending into the ball in winter, recommend putting the ball into a lump of snow, mixed with salt; or if the instrument be made in summer, into spring-water impregnated with salt-petre, that the condensed spirit may shew how far it will retire in extreme cold. If it rises to too great a height from the ball, part of it is to be taken out; and that the tube may not be made longer than necessary, it is convenient to immerge the ball, filled with its spirit in boiling water, and to mark the farthest point to which it then rises. When the thermometer is properly filled, with a lamp heat the little bubble left at the end of D red-hot, and seal it hermetically, leaving, as Dr. Defaguliers recommends, in the thermometer only the third part of the air that was in it, which will give room to the dilatation of the spirit; and this rarefied air will prevent the air left in the spirit, even after the air-pump has been applied, from dividing the spirit by its expansion. To the tube apply a scale, divided into one hundred equal parts, from C towards D, and also from C towards B.

Now, spirit of wine rarefying and condensing very considerably; as the heat of the ambient air increases, the spirit will dilate, and consequently will ascend in the tube; and as the heat decreases, the spirit will descend: and the degree or quantity of ascent and descent will be seen in the scale. Yet as the ratio of yesterday's heat to to-day's is not hereby discovered, this instrument is not strictly a thermometer, any more than the former.

It is to be here observed, 1. That as the natural gravity of the liquor makes it tend downwards, so it resists its ascent out of the ball into the tube; and that the more, as it rises higher; for which reason, some have advised to have the tube horizontal.

2. Since there must of necessity be some air left in the void part of the tube, over the liquor, that air, by its elasticity, will tend downwards, and of consequence will resist

the rise of the liquor, and be compressed by it as it does rise: its elasticity therefore is thus increased.

3. Since it is found from experience, that a less degree of heat is communicated more easily to the spirit of wine in the ball than a greater, the rarefactions of the spirit of wine are not proportionable to their producing causes; especially since a greater degree of heat finds more liquor in the tube than a less does, to which, notwithstanding, the heat may be more easily communicated than to that stagnating in the ball.

4. Spirit of wine is incapable of bearing very great heat or very great cold. It boils sooner than any other liquor, and, therefore, the degrees of heat of boiling fluids cannot be determined by this thermometer. And though it retains its fluidity in pretty severe cold, yet it seems not to condense very regularly in them: and at Torneo, near the polar circle, the winter cold was so severe, as Maupertuis informs us, that the spirits were frozen in all their thermometers. So that the latitude of heat and cold, which spirit of wine is capable of indicating, is much too limited to be of very great or universal use. On these accounts, the Florentine thermometer, though it has been much used, is far from being an accurate measure of heat, &c. to which may be added what Dr. Halley observes in the *Philosophical Transactions*, that he has learned from those who have kept spirit of wine long, that it always loses part of its expansive force in course of time.

This objection, suggested by Dr. Halley, and often insisted on by others, has, according to Dr. Martine, no great weight. Well rectified spirit of wine, if sealed up in a glass, is in a considerable degree unalterable. It cannot evaporate; and by many years experience its force of expansion has continued the same; as, beside other observations, we know especially from the *Annual Registers* of M. de la Hire's spirit thermometer, that have been kept in the *Observatory* for many years.

Another great defect of these, and other thermometers, is, that their degrees are not comparable with each other. They mark, indeed, the different degrees of heat and cold; but each marks only for itself, and after its own manner; because they do not proceed from any point of heat, or cold, that is common to them all. It is with them as with two clocks, which for want of having been first set to the same hour by the sun, will, indeed, mark that one, two, or more hours are passed, but not what hour it is by the day. Nor can we be assured, that when the liquor is risen a degree in two different thermometers, they have both suffered the same impression of an equal additional heat: since the spirit of wine may not be the same in both; and, in proportion as the spirit is more or less rectified, it will rise more or less high by the same heat. Nor is this all; for in graduating thermometers, they often take equal lengths of the tube for equal ascents of the spirit: whereas, supposing the diameters of the tube equal throughout, which very rarely happens, there are so many irregularities within, that a certain length of tube sometimes requires double the quantity of liquor to fill it, that the same length in another tube of the same diameter requires. All which arises from the unequal thickneses of the parietes of tubes in different places; and from accidental prominences and cavities, always found in the inner surfaces of tubes; and especially from their being always bigger at one end than the other.

Besides, the divisions of the scale cannot accurately indicate the quantity of rarefaction, unless the proportion of the cavity of the tube D B to that of the ball A were known. Hence it is, that the comparison of thermometers becomes so precarious and defective. Yet the most curious and interesting use of thermometers is, what ought to arise from such

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such comparifon. It is by this we fhould know the heat or cold of another feafon, of another year, another climate, &c. and what is the greateft degree of heat or cold in which men and other animals can fubfift.

M. de Reaumur contrived a new thermometer for the purpofe; wherein the inconveniences above recited are propofed to be remedied. He took a large ball and tube, and knowing the content of the ball as well as that of the tube in every part, he graduated the tube, fo that the fpace from one divifion to another might contain a thoufandth part of the liquor, which liquor would contain one thoufand parts when it flood at the freezing point: then putting the ball of his thermometer, and part of the tube, into boiling water, he obferved whether it rofe eighty divifions; and if it exceeded thefe, he changed his liquor, and by adding water lowered it, fo that on the next trial from the freezing point to the point of boiling water, it fhould only rife eighty divifions: but if the liquor, being too low, fell fhort of eighty divifions, he raifed it by adding rectified fpirit to it. The liquor thus prepared fuited his purpofe, and ferved for making a thermometer of any fize, whole fcale would agree with his ftandard. Such liquor, or fpirits, being about the ftrength of common brandy, may eafily be had any where, or made of a proper degree of denfity by raifing or lowering it.

The abbé Nollet made many excellent thermometers upon M. de Reaumur's principle. Dr. Martine, however, expreffes his apprehenfions that thermometers of this kind are conftituted on principles, that will by no means be found fo accurate as were to be wifhed and expected. The balls, or bulbs, being large, as three or four inches in diameter, are neither heated nor cooled foon enough to fhew the variations in the heat of bodies, and in the weather. Small bulbs and fmall tubes, he fays, are much more convenient, and may be conftituted with fufficient accuracy. Though it muft be allowed, that Reaumur, by his excellent fcale, and by depriving the fpirit of wine of its air, and expelling the air by means of heat from the ball and tube of his thermometer, has brought it to as great a degree of perfection as it may poffibly admit; yet it is liable to fome of the inconveniences of *spirit* thermometers, and much inferior to the *mercurial* thermometers. Thermometers of this kind, and thofe of mercury, do not agree in indicating the fame degrees of extreme cold; for when the mercury has flood at 22° below 0, the fpirit indicated only 18°; and when the mercury flood at 28° or 37° below 0, the fpirit refted at 25° or 29°. See the defcription of Reaumur's thermometer at large in Mem. de l'Acad. R. des Scienc. an. 1730, p. 645. Hift. p. 15. Ibid. an. 1731, p. 354. Hift. p. 7.

In 1740, M. Micheli du Crest conftituted a fpirit thermometer, to which he annexes four fcales befides its own, *viz.* that of the old thermometer in the Obfervatory at Paris, Reaumur's, de l'Ifle's, and Fahrenheit's. See *Fixed Points of THERMOMETERS.*

**THERMOMETER, Mercurial.** It is a circumftance of principal importance in the conftituted of thermometers, to procure a fluid that meafures equal variations of heat by correfponding equal variations in its own bulk or volume: and the fluid which poffeffes this effential requifite in the moft perfect degree is mercury: the variations in its bulk approaching nearer to a proportion with the correfponding variations of its heat than any other fluid. This general propofition M. de Luc has very elaborately evinced, by fhewing that the condenfations of fluids, which increafe in bulk when they freeze, are not proportional to the diminutions of heat; and that the dilatations of fluids, which are

eafily converted into vapour by heat, are not proportional to the augmentations of heat: whereas the bulk of mercury is not enlarged when it freezes, and it refifts evaporation more than every other liquid that has been ufed in the conftituted of thermometers. Befides, it is of all liquids the moft eafily purged of its air. It is alfo the moft proper for meafuring very confiderable variations of heat; for, if a fcale be graduated with 0 at the point of melting ice, and 80 at that of boiling water, mercury well purged of its air will indicate feven times this difference of heat, or 561 degrees in fuch a fcale; as it will condense without freezing to - 261 of this fcale, and expand without boiling to 300 of the fame fcale. Mercury is alfo more fenfible than any other fluid, air excepted, and conforms more readily to the feveral variations of heat. Moreover, as mercury is an homogeneous fluid, it will in every thermometer exhibit the fame dilatation or condenfation by the fame variations of heat. The expansion of mercury is fcarcely lefs regular than that of folids, which probably approaches the neareft to the fteps of the natural fcale, though not without fome inequality; and therefore a portion of mercury inclofed in a bulb of glafs, having a fine tube connected with it, forms a thermometer the moft convenient and probably the moft accurate of any, for common ufe; the degrees correfponding very nearly with thofe of the natural fcale, although, according to the moft accurate experiments, they appear to indicate, towards the middle of the common fcale of Fahrenheit, a temperature two or three degrees too low. There is an inequality of the fame kind, but ftill greater, in the degrees of the fpirit thermometer; and this inftrument has alfo the difadvantage of being liable to burft in a heat below that of boiling water; nevertbelefs, it is well calculated for the meafurement of very low temperatures, fince pure alcohol has never yet been frozen, while mercury has been reduced to a folid by the cold of Siberia and of Hudfon's Bay; but both mercury and linfeed oil fupport a heat of between 500° and 600°, without ebullition.

In order to render thermometers uniform and comparable, it is defirable that mercury, fo excellently adapted for this purpofe, fhould be the only fluid ufed in the conftituted of them, more efpecially as a thermometer with mercury may be more eafily conftituted than any others. De Luc's *Récherches*, &c. vol. i. part ii. cap. 2. paffim.

Dr. Halley, though apprifed only of fome of the remarkable properties of mercury above recited, feems to have been the firft who fuggelted the application of this fluid to the conftituted of thermometers. *Phil. Tranf. Abr.* vol. ii. p. 34.

Boerhaave (*Chem. i. p. 720.*) fays, thefe mercurial thermometers were firft contrived by Olaus Roemer; but the claims of Fahrenheit of Amftterdam, who gave an account of his invention to the Royal Society in 1724 (*Phil. Tranf. N° 381, or Abr. vol. vii. p. 49.*), have been generally allowed. And though Prins and others, in England, Holland, France, and other countries, have made this inftrument as well as Fahrenheit, moft of the mercurial thermometers are graduated according to his fcale, and are called *Fahrenheit's* thermometers. Thefe are made of different lengths, and with fome variation in the form of the bulb, according to the purpofes for which they are defigned. Inftead of the ball, ufed in the fpirit thermometer, a cone or cylinder is annexed to the tube, which may be eafily enlarged or diminifhed, and made of fuch a magnitude, that its capacity may have a certain and known proportion to that of the tube; and by this means feveral thermometers may be conftituted to the fame fcale: befides, the heat more eafily

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easily penetrates and reaches the inmost parts of the cylindric bulb, and causes the whole content to expand uniformly, and the mercury to rise almost immediately; whereas in thermometers with a spherical bulb it is seen first to fall, and then to rise. This phenomenon has been long since noticed both in Florentine and mercurial thermometers, when they are suddenly plunged into a heated liquor, the spirit of wine or mercury first descends, and then ascends; and when they are plunged into a cold fluid, the included liquor first ascends and then descends: this is the more remarkable in thermometers whose bulb is made of thick glass; and the reason of the phenomenon is obvious. The bulb of glass is sooner affected by the heat or cold applied to it than the included fluid; and as the glass expands by heat, the capacity of the bulb is enlarged, and the liquor descends in the tube, but being condensed by cold, and its capacity diminished, the liquor is pressed upwards in the tube; and both these effects continue till the heat and cold equally affect the inclosed fluid. Hence it follows, that all the variations of ascent and descent, to which the spirit or mercury is subject in the thermometer, are only the difference of the rarefactions and condensations of glass, and of the contained fluid. Hist. Ac. Royal, 1705.

The cone, or cylinder, of the thermometer is made of glass of a moderate thickness, left, when the exhausted tube is hermetically sealed, its internal capacity should be diminished by the weight of the ambient atmosphere. When the mercury is thoroughly purged of its air and moisture by boiling, the thermometer is filled with a sufficient quantity of it; and before the tube is hermetically sealed, the air is wholly expelled by heating the mercury, so that it may be rarefied and ascend to the top of the tube. To the side of the tube is annexed a scale (see *fig. 4.*) which Fahrenheit divided into six hundred parts, beginning with that of the severe cold which he had observed in Iceland in 1709, or that produced by surrounding the bulb of the thermometer with a mixture of snow or beaten ice and sal ammoniac or sea-salt. This he apprehended to be the greatest degree of cold, and accordingly he marked this, as the beginning of his scale, with 0; the point at which mercury begins to boil, he conceived to shew the greatest degree of heat, and this he made the limit of his scale. The distance between these two points, he divided into six hundred equal parts or degrees; of which 32 reckoned from 0, indicates the degree of cold when snow or ice thaws naturally, or water begins to freeze, and this is called the *freezing point*: and he marked the heat of boiling water with 212, &c. In order more particularly to explain the divisions of this scale, and to shew how the dilatation and condensation of the mercury are estimated by it, we may observe that the bulb is supposed to contain, according to Boerhaave and Muschenbroek, 11124 parts of quicksilver, which stands at the lowest mark, or *gr. 0*, in an intense cold, &c. as above determined: if the bulb be immersed in snow or ice thawing naturally, or in water beginning to freeze, the quicksilver is dilated, and rises in the tube 32 of these 11124 parts; and therefore the space of the tube from *gr. 0* to the freezing point *gr. 32*, is divided into thirty-two equal parts. When the thermometer is placed in water brought to a strong boiling at a middle state of the atmosphere in places near the level of the sea, when the mercury in the barometer stands at about 30 inches or a very little under it, the quicksilver is dilated 212 of these parts beyond its original bulk of 11124, so as now to possess in the bulb and tube together a space equal to 11336 such parts; and the space from *gr. 32* to *gr. 212*, is divided into 180 equal parts or degrees of the thermometer;

which, if the tube be long enough, may be protracted as far as is convenient. It may extend well enough to *gr. 600*, and not much farther, for with a heat but little greater than that the mercury begins to boil.

Dr. Boerhaave, in one place, makes the number of parts into which the mercury in the bulb is supposed to be divided to be 10782 instead of 11124, and in another place states it at 11520, which Dr. Martine apprehends to be nearer the truth, or about 11790 parts; and he thinks the easiest and surest method is to fill the bulb and tube, without being solicitous about the bulk of the quicksilver, so that in freezing water, or melting ice, the mercury shall stand at a convenient height, which must be very nicely marked *gr. 32*; and then as accurately to observe where it stands when dilated by the heat of boiling water to *gr. 212*. The intermediate space is then divided into 180 degrees, which scale may be protracted upwards or downwards as far as we shall judge convenient. See *Fixed Points of THERMOMETERS*.

In the above method of graduating the scale, the bore of the tube is supposed to be perfectly cylindric, which cannot always be obtained. But though it be tapering or somewhat unequal, it is easy to manage that matter, in the manner proposed by the abbé Nollet (*Leçons de Phys. Exp. tom. iv. p. 376.*) by making a small portion of the quicksilver, *c. g.* as much as fills up an inch or half an inch, slide backward and forward in the tube; and thus to find the proportions of all its inequalities, and from thence to adjust the divisions to a scale of the most perfect equality. See *Observations on the Construction of THERMOMETERS*.

Other thermometers of a similar construction have been accommodated to common use, the scale of which is only a part of that above described. They have been made of a small size and portable form, and the tube with its annexed scale has been enclosed in another thicker glass hermetically sealed, in order to preserve it from injury. Mr. Ramsden, at the desire and for the use of Mr. Hunter in his experiments on the heat of animals and vegetables, constructed very small thermometers, six or seven inches long, and not above two twelfths of an inch thick in the stem; having the external diameter very little larger than that of the stem, on which was marked the freezing point. The stem was embraced by a small ivory scale, so as to slide upon it easily, and retain any position. Upon the hollow surface of this scale were marked the degrees which were seen through the stem. *Phil. Trans. vol. lxxviii. part i. p. 8.*

Several varieties of thermometers are constructed for philosophical purposes. For comprehending the whole range of thermometrical temperature from the most intense artificial cold to the boiling point of mercury, it is necessary to be provided with a very long tube; but for most chemical purposes, it need only be graduated to about ten degrees above the boiling point, which will reach the temperature of most saline solutions when boiling. For experiments in intense cold, a spirit thermometer should be graduated about 100 degrees below 0, and the lower extremity of the scale should be at some distance from the bulb, that the temperature may be observed without lifting the bulb out of any deep vessel that may contain the freezing mixture. The most delicate and sensible thermometers are made with a very small bulb, scarcely larger than the stem, and a tube of an extremely narrow bore, not larger than a horse-hair. For chemical purposes also, the scale should either be scratched on the glass itself, or, as this is difficult to be seen in a common light, an ivory scale should be attached without reaching so low as the bulb, that the latter may be safely immersed in acid or corrosive liquors.

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In 1733, M. de l'Isle of Peterburg constructed a *mercurial* thermometer (see *fig. 4.*) on the principles of Reaumur's *spirit* thermometer. In his thermometer, the whole bulk of quicksilver, when immersed in boiling water, is conceived to be divided into 10,000, or rather 100,000 parts; and from this one fixed point, the various degrees of heat, either above or below it, are marked in these parts on the tube or scale, by the various expansion or contraction of the quicksilver in all the imaginable variety of heat. Dr. Martine apprehends it would have been better if M. de l'Isle had made the integer of 100,000 parts, or fixed point at freezing water, and from thence computed the dilatations or condensations of the quicksilver in those parts. All the common observations of the weather, &c. would have been expressed by numbers increasing as the heat increased, which is the more natural way; nor would there have been any great incongruity, or inconvenience, in expressing, after the manner of Reaumur, the few observations that occur below simple freezing by numbers of contraction below *gr. 0.* or 100,000. However, in practice, it will not be very easy to determine exactly all the divisions from the alteration of the bulk of the contained fluid. And besides, as glass itself is dilated by heat, though in a less proportion than quicksilver, so that it is only the excess of the dilatation of the contained fluid above that of the glass that is observable; if different kinds of glass be differently affected by a given degree of heat, this will make a seeming difference in the dilatation of the quicksilver in the thermometers, constructed in the Newtonian method, either by M. de Reaumur's or M. de l'Isle's rules. Accordingly, it has been found, that the quicksilver in thermometers, constructed in M. de l'Isle's way, has stood at different degrees of the scale when immersed in thawing snow. In some it was at *gr. 154.* in others at 156, and in another at 158: and it appears by M. de l'Isle's own account, that his thermometers disagree considerably from one another. *Celsius's* thermometer has been chiefly used in Sweden, and hence it has been called the *Svedisch* thermometer. The French chemists have lately adopted it, under the name of *centigrade* thermometer. See *Fixed Points of THERMOMETERS*, and the table at the close of this article.

**THERMOMETER, Metalline,** is a name given to a machine composed of two metals, which, whilst it indicates the variations of cold and heat, serves to correct the errors that result from hence in the construction of pendulum clocks. Instruments of this kind have been contrived by Graham, Le Roy, in 1738, Ellicot, Harrison, &c. See *Compound PENDULUM*.

We have also an account of instruments of this kind invented by Mortimer, Frothingham, and Fitzgerald, in the *Phil. Transf.* vol. xlv. p. 689, vol. xlv. p. 129, and vol. li. p. 823; to which we must refer for a particular description of each, illustrated by figures.

M. de Luc has likewise described two thermometers of metal, which he uses for correcting the effects of heat upon a barometer, and an hygrometer of his construction connected with them. In one of these, a strong rod of well-hardened brass, supports upon an edge, at a convenient distance from the centre of motion, a lever, which holds the scale of the barometer suspended, and makes it rise or fall by the dilatation or condensation of the brass rod, as the quicksilver rises or falls in the barometer, by the corresponding variations of heat. This scale of the barometer, when it moves, draws or loosens a thread of silk-grafs, which goes over a small pulley placed upon the same axis with a much larger one, to which the scale of the hygrometer is hung likewise by a similar thread, which thus varies, by the proportion of the diameters of the pulleys, as the heat makes

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the quicksilver in the hygrometer vary. This instrument is convenient for meteorological observations: because it saves one observation and two corrections for the heat; but it is necessary from time to time to correct an irregularity in it, which is easily perceived by means of an index, carried by the moveable scales of the two instruments, which, going over immoveable scales of the same sort, shews their difference of height. When this difference is no longer conformable to the indication of the thermometer, it is easily rectified by turning small pegs, on which is twisted the thread of silk-grafs, which serves for the suspension of the scales. The irregularity just mentioned consists in this, that when the heat, after having varied, returns to the same point of the quicksilver thermometer, the metallic thermometer does not return to it exactly, but varies nearly in the following manner: during the summer, the latter gains constantly on the former, *i. e.* amidst its variations, it always preserves a small part of the lengthening, which is at that time its ordinary state. In winter, on the contrary, it becomes insensibly a little too short. The other metallic thermometer, which is more curious than useful, on account of its greater irregularity, consists of a rod of lead, which, communicating by a thread of silk-grafs with a small pulley fixed to the same axis with a greater one, conducts, by means of another pulley, a needle through whose axis, which is bored, passes another axis that carries the needle of a pulley barometer. Thus this instrument marks the heat and weight of the air upon two concentric circles, by means of two needles turning upon the same centre, as in clocks; besides which, the needle of the thermometer points out upon a third circle the correction for the heat, to be made on the barometer. See *Phil. Transf.* vol. lxxviii. part i. p. 437, &c.

**THERMOMETERS, Oil.** To this class belongs sir Isaac Newton's thermometer, constructed in 1701, with linseed oil instead of spirit of wine. This liquor has the advantage of being sufficiently homogeneous, and capable of a considerable rarefaction, not less than fifteen times greater than that of spirit of wine. It has not been observed to freeze even in very great colds, and it is able to bear a great heat, about four times that of water, without boiling. With these advantages it was made use of by sir Isaac Newton, who discovered by it the comparative degree of heat for boiling water, melting wax, boiling spirit of wine, and melting tin; beyond which it does not appear that this thermometer was applied. The method he used for adjusting the scale of this oil-thermometer was as follows: supposing the bulb, when immersed in thawing snow, to contain 10,000 parts, he found the oil expanded by the heat of the human body so as to take up one thirty-ninth more space, or 10256 such parts; and by the heat of water boiling strongly, 10725; and by the heat of melting tin, 11516. So that, reckoning the freezing point as a common limit between heat and cold, he began his scale there, marking it *gr. 0.* and the heat of the human body he made *gr. 12*; and, consequently, the degrees of heat being proportional to the degrees of rarefaction, or 10256 : 10725, *i. e.* 256 : 725 :: 12 : 34, the heat of boiling water was expressed by *gr. 34* =  $\frac{725 \times 12}{256}$ ; and that

of the melting tin by *gr. 72.* *Phil. Transf.* No. 270, or *Abr.* vol. iv. part ii. p. 3.

Although in this graduation sir Isaac Newton does not specify any degree of cold below that of freezing water, yet it would be easy to protract his scale downward below *gr. 0.* or the freezing point, and thus to adapt it for estimating greater degrees of cold, like other thermometers. But there is another insuperable inconvenience that attends all

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thermometers made with oil, or any other viscid liquor, *viz.* that such a liquor adheres too much to the sides of the tube. In a sudden cold or fall of the oil, much of it sticks by the way, and only sinks gradually afterwards, so that at first the surface appears really lower than the present temperature requires. And besides, as at all times some of the oil must continue to stick and moisten the inside of the tube, in different degrees of heat and cold, the oil, becoming alternately more or less viscid, will adhere sometimes more and sometimes less; and will, therefore, inevitably disturb the regularity and uniformity of the thermometer. Martine's Effays, Eff. iii.

**THERMOMETERS, Fixed Points of.** Various methods have been proposed by various authors, for finding a fixed point, or degree, of heat and cold, from which to reckon the other degrees, and adjust the scale; so that observations made at the same or different times, in different places, might be compared together. For want of this, notwithstanding all the numerous registers of the weather, &c. that have been kept and published by different authors, we are much at a loss to determine the comparative differences of heat and cold in different countries and climates, and the result of many other observations. If all the weather-glasses in the world had been made according to one determined scale, these inconveniences and uncertainties would have been prevented; which, indeed, are now unavoidable, and must still continue so, till all agree to graduate their thermometers in the same manner, or at least determine some fixed or unalterable points of heat, to which all the different scales of those instruments may be reduced. The honourable Mr. Boyle was very sensible of this inconvenience, and much laments it; and he proposed the freezing of the essential oil of aniseeds, as a term of heat and cold that might be of use in making and judging of thermometers, and so to graduate them from this point according to the proportional dilatations or contractions of the included spirits. He mentioned also the coldness requisite to begin the congelation of distilled water as another fixed term that might be adopted; for he was persuaded, that among the ordinary waters, some were apt to freeze more easily than others. But he was deterred from prosecuting this scheme of fixing a standard for making and graduating all thermometers in the same way. Experiments, &c. on cold, in his works abridged by Shaw, vol. i. p. 579.

Dr. Halley (Phil. Trans. Abr. vol. ii. p. 36.) seems to have been fully apprized of the bad effects of the indefinite method of constructing thermometers, and wished to have them adjusted to some determined points. What he seems to prefer for this purpose is the degree of temperature which is found in subterranean places, where the heat in summer and cold in winter appears to have no influence. But this degree of temperature is shewn by Dr. Martine to be a term for the universal construction of thermometers, both inconvenient, as it cannot be easily ascertained; and a precarious one, as the difference of soils and depths may occasion a considerable variation. Another term of heat which he thought might be of use in a general graduation of thermometers, is that of boiling spirit of wine that has been highly rectified; but a much more convenient term of heat, though less insisted on by Dr. Halley, is that of boiling water. The first trace that occurs of the method of actually applying fixed points or terms to the thermometer, and of graduating it, so that the unequal divisions of it might correspond to equal degrees of heat, is the project of Renaldinus, professor, of Padua, in 1694: it is thus described in the Acta Erud. Lips. "Take a slender tube, about four palms long, with a ball fastened to the

fame; pour into it spirit of wine, enough just to fill the ball, when surrounded with ice, and not a drop over: in this state, seal the orifice of the tube hermetically, and provide twelve vessels, each capable of containing a pound of water, and somewhat more; and into the first pour eleven ounces of cold water, into the second ten ounces, into the third nine, &c.: this done, immerge the thermometer in the first vessel, and pour into it one ounce of hot water, observing how high the spirit rises in the tube, and noting the point with unity: then remove the thermometer into the second vessel, into which are to be poured two ounces of hot water, and note the place the spirit rises to with 2. By thus proceeding till the whole pound of water is spent, the instrument will be found divided into twelve parts denoting so many terms or degrees of heat; so that at 2 the heat is double to that at 1, at 3, triple, &c."

But this method, though plausible, Wolfius shews, is deceitful, and is built on false suppositions; for it takes for granted, that we have one degree of heat, by adding one ounce of hot to eleven of cold water; two degrees, by adding two ounces to ten, &c.: it supposes, also, that a single degree of heat acts on the spirit of wine in the ball with a single force: a double with a double force, &c. lastly, it supposes, that if the effect be produced in the thermometer by the heat of the ambient air, which is here produced by the hot water, the air has the same degree of heat with the water.

Soon after this project of Renaldinus, *viz.* in 1701, Sir Isaac Newton constructed his *oil* thermometer, and fixed the base or lowest fixed point of his scale at the temperature of thawing snow, and twelve at that of the human body, &c. in the manner explained under the article *Oil THERMOMETER.*

M. de Luc observes, that the second term of his scale should have been at a greater distance from the first, and that the heat of boiling water would have answered this purpose better than that of the human body.

In 1702, M. Amontons contrived his *universal* thermometer, the scale of which was graduated in the following manner. He chose for the first term the weight that counterbalanced the air included in his thermometer, when it was heated by boiling water: and in this state he so adjusted the quantity of mercury contained in it, till the sum of its height in the tube, and of its height in the barometer at the moment of observation, was equal to seventy-three inches. Fixing this number at the point to which the mercury in the tube rose by plunging it into boiling water, it is evident, that, if the barometer at this time was twenty-eight inches, the height of the column of mercury in the thermometer above the level of that in the ball was forty-five inches; but if the height of the barometer was less by a certain quantity, the column of the thermometer ought to be greater by the same quantity, and reciprocally. He formed his scale on the supposition that the weight of the atmosphere was always equal to that of a column of mercury of twenty-eight inches, and divided it into inches from the point 73 downwards, marking the divisions with 72, 71, 70, &c. and he subdivided the inches into lines.

But as the weight of the atmosphere is variable, the barometer must be observed at the same time with the thermometer, that the number indicated by this last instrument may be properly corrected, by adding or subtracting the quantity of which the mercury is below or above twenty-eight inches in the barometer. In this scale, then, the freezing point is at  $51\frac{1}{2}$  inches, corresponding to *gr.* 32 of Fahrenheit, and the heat of boiling water at 73 inches,

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inches, answering to *gr.* 212 of Fahrenheit's: and thus they may be easily compared together.

The fixed points of Fahrenheit's thermometer, which is generally used in Great Britain, (as we have already observed under *Mercurial THERMOMETER*,) are the congelation produced by sal ammoniac and the heat of boiling water. The interval between these points is divided into 212 equal parts; the first of these points is marked 0, 32 degrees below the freezing point, and the other 212; the distance of course between the freezing and boiling points being 180. The reason why Fahrenheit fixed his scale so far below the water-freezing point was founded on an erroneous hypothesis relative to the real *zero* or point of absolute privation of heat; nevertheless it has this advantage, that the distinction between the positive and negative terms, or those which express degrees above or below the *zero*, much less frequently occurs in any experiments, and scarcely ever in the register of natural cold in temperate climates, by which many accidental errors are avoided. Reaumur, in his thermometer, the construction of which he published in 1730, and which is generally used in France and other parts of the continent, begins his scale at an artificial congelation of water in warm weather, which, as he uses large bulbs for his glasses, gives the freezing point much higher than it should be, and at boiling water he marks *gr.* 80, (the distance between both points being 80,) which point Dr. Martine apprehends to be more vague and uncertain than his freezing point. The spirit in the thermometer, he observes, is absolutely incapable of such a great heat as Reaumur ascribed to it, and that not by a small or trifling difference. He finds, that highly rectified spirit of wine cannot be heated beyond *gr.* 175 in Fahrenheit's thermometer, while boiling water raises the quicksilver 37 degrees higher; and common brandy was able to conceive a heat no greater than about *gr.* 190. So far, he concludes, was Reaumur in the wrong, when he thought that all spirits, weak and strong, immersed in boiling water, received a given degree of heat, and that equal to the heat of the surrounding water. He supposes his standard heat could take a heat only of about *gr.* 180; less by 32 degrees than what he reckoned. In order to determine the correspondence of his scale with that of Fahrenheit, it is to be considered that his boiling-water heat is really only the boiling heat of weakened spirit of wine, coinciding nearly, as Dr. Martine apprehends, with Fahrenheit's *gr.* 180. And as his *gr.* 10 $\frac{1}{2}$  is the constant heat of the cave of the observatory at Paris, or Fahrenheit's *gr.* 53, he thence finds his freezing point, instead of answering just to *gr.* 32, to be something above *gr.* 34.

The thermometer of M. de l'Isle, of which he presented an account to the Academy of Sciences at Petersburg in 1733, has only one fixed point, which is the heat of boiling water, and, contrary to the common order, the several degrees are marked downwards from this point or *zero*, according to the condensations of the contained quicksilver, and consequently by numbers increasing as the heat decreases to 150, the freezing point. In order to determine the extent of the degrees of this scale, M. de l'Isle first weighed the empty tube, and then weighed it full of mercury; and the difference of these two weights gave him that of the mercury. He then exposed the thermometer to the heat of boiling water, and took care to preserve the mercury, which this increase of heat forced out of it; this he accurately weighed, and deducting its weight from the total weight of the mercury, he made the remainder, or that which was left in the thermometer, equal to 10000: he then found by calculation how many 10000 parts of this

residue that forced out of the tube contained, and these parts formed the divisions of the scale from the point, determined by the condensation of the mercury to the same point at which it stood before it was plunged in boiling water, to the upper end of the tube; and these divisions formed the extent of the degrees of M. de l'Isle's scale. According to his standards, the freezing point, says Dr. Martine, is near to his *gr.* 150, corresponding to Fahrenheit's *gr.* 32, by which means they may be compared; but M. Ducrest says, that this point ought to be marked at least at *gr.* 154.

M. Ducrest, in his spirit thermometer, constructed in 1740, made use of two fixed points; the first, or 0, indicated the temperature of the earth, and was marked on his scale in the cave of the Royal Observatory at Paris; and the other was the heat of boiling water, which the spirit in his thermometer was made to endure, by leaving the upper part of the tube full of air. He divided the interval between these points into 100 equal parts; calling the divisions upwards degrees of heat, and those below 0 degrees of cold.

He afterwards regulated his thermometer by the degree of cold indicated by melting ice, which he found to be 10 $\frac{2}{3}$ . In Celsius's, or the centigrade thermometer, the freezing point, like that of Reaumur's, was 0, the boiling point at 100, and the distance between both 100. See the table at the close of the article.

The Florentine thermometers made and used by the members of the famous academy *del' Cimento*, being some of the first instruments of the sort, were vaguely graduated, some of them having many more degrees than others; but those of their most common graduation were of two sorts; in one sort the freezing point, determined by the degree at which the spirit stood in the ordinary cold of ice or snow (probably in a thawing state), and coinciding with *gr.* 32 of Fahrenheit, fell at *gr.* 20; and in the other sort at *gr.* 13 $\frac{2}{3}$ : and the natural heat of the viscera of cows and deer, &c. raised the spirit in the latter, or less sort, to about *gr.* 40, coinciding with their summer heat, and nearly with *gr.* 102 in Fahrenheit's, and in their other long thermometer, the spirit, when exposed to the great midsummer heat in their country, rose to the point at which they marked *gr.* 80. The freezing point of one was 20, the boiling point 174, and the distance between both was 154: in the other the freezing point was 13 $\frac{2}{3}$ , the boiling point 81 $\frac{2}{3}$ , and the distance 68 $\frac{2}{3}$ .

In the Parisian thermometer, or the ancient thermometer of the Academy of Sciences, the freezing point was at 25, the boiling point at 239, and the distance between both 214.

In the thermometer of the observatory at Paris, made of spirit of wine by M. de la Hire, the spirit always stands at *gr.* 48, in the cave of the observatory, corresponding to *gr.* 53 in Fahrenheit's; and his *gr.* 28 corresponded with 51 inches six lines in Amontons's thermometer, and consequently with the freezing point, or *gr.* 32 of Fahrenheit's. This thermometer of De la Hire, which stood in the observatory of Paris above 60 years, seems to have been graduated thus; the freezing point 28, the boiling point 199 $\frac{1}{2}$ , and the distance between both 171 $\frac{1}{2}$ . In Amontons's thermometer the freezing point was 51 $\frac{1}{2}$ , the boiling point 73, and the distance between them 21 $\frac{1}{2}$ .

In the thermometer of Poleni, made after the manner of Amontons's, but with less mercury, 47 inches corresponded, according to Dr. Martine, with 51 in that of Amontons's, and 53 with 59 $\frac{1}{2}$ . It was graduated thus; the freezing point at 47 $\frac{1}{2}$ , the boiling point at 62 $\frac{1}{2}$ , and

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the distance between them  $15\frac{1}{2}$ . In Crucequius's, the freezing point was 1070, the boiling point 1510, and the distance 440.

In the ancient standard thermometer of the Royal Society, after which thermometers were for a long time constructed in England, Dr. Martine found that *gr.*  $34\frac{1}{2}$ , answered to *gr.* 64 in Fahrenheit's, and *gr.* 0 to 89 or 88. From that point the numeration ascended and descended thus; the freezing point was  $73\frac{1}{4}$ , the boiling point  $141\frac{1}{4}$ , and the distance between them  $215\frac{1}{2}$ . In sir Isaac Newton's, the freezing point was 0, the boiling point 34, and the distance 34.

In the thermometers graduated for adjusting the degrees of heat proper for exotic plants, &c. in stoves and green houses, the middle temperature of the air is marked at *gr.* 0, and the degrees of heat and cold are numbered both above and below. Many of these are made on no regular and fixed principles. But in that formerly much used, called Fowler's regulator, the spirit fell, in melting snow, to about *gr.* 34 under 0; and Dr. Martine found, that his *gr.* 16 above 0, coincided with nearly *gr.* 64 of Fahrenheit. His 0 seems to have coincided with about the 53d or 54th degree of Fahrenheit's, and from that point the numeration ascended and descended thus; the freezing point 34, the boiling point  $250\frac{1}{2}$ , and the distance between them  $284\frac{1}{2}$ .

Dr. Hales (Statistical Essays, vol. i. p. 58.) in his thermometer made with spirit of wine, and used in experiments on vegetation, began his scale with the lowest degree of freezing, or *gr.* 32 of Fahrenheit, and carried it up to *gr.* 100, which he marked where the spirit stood when the ball was heated in hot water, on which wax swimming first began to coagulate, and this point Dr. Martine found to correspond with *gr.* 142 of Fahrenheit. But by experience Hales's *gr.* 100 falls considerably above our *gr.* 142. According to others, his freezing point was 0, his boiling point was 163, and the distance of course 163.

In the Edinburgh thermometer, made with spirit of wine, and used in the meteorological observations published in the Medical Essays, the scale is divided into inches and tenths. In melting snow the spirit stood at  $8\frac{2}{5}$ , and the heat of the human skin raised to  $22\frac{2}{5}$ . Dr. Martine found, that the heat of the person who graduated it was *gr.* 97 of Fahrenheit. It seems to have been graduated thus; the freezing point  $8\frac{1}{2}$ , the boiling point 47, and the distance between them  $38\frac{1}{2}$ .

As it is often of use to compare different thermometers, in order to judge of the result of former observations, we have annexed from Dr. Martine's Essays, the table by which he compared fifteen different thermometers. See *Plate XVI. Pneumatics, fig. 4.* See also the table at the close of this article.

There is a thermometer which was formerly much used in London, called the thermometer of Lyons, because M. Cristin brought it there into use, which is made of mercury: the freezing point is marked *gr.* 0, and the interval from that point to the heat of boiling water is divided into 100 equal degrees.

From the above abstract of the history of the construction of thermometers, it appears that freezing and boiling water have furnished the distinguishing points that have been marked upon almost all thermometers. The inferior fixed point is that of freezing, which some have determined by the freezing of water, and others by the melting of ice; and though the difference between these two temperatures is not commonly very considerable, yet it is not invariable.

It is now well known, that all, or almost all bodies, by changing from a fluid to a solid state, or from the state of air elastic to that of an unelastic fluid, generate heat; and that cold is produced by the contrary process.

In order to obtain this fixed point or limit, melting ice, or ice powdered and mixed with water, will produce the same temperature. And though there may be some trifling difference between the temperature of ice disposed to melt, and that of melted ice or the water produced by it; this difference, however, has no sensible effect on the thermometer; consequently, the temperature of water successively produced by ice, and accumulated in its interstices, or from powdered ice mixed with the water which is produced by it in melting, affords, as De Luc observes, a fixed point, which is easily obtained, and which should be adopted in the construction of all thermometers.

The superior fixed point of almost all thermometers, is the heat of boiling water; but this point cannot be considered as fixed, unless the heat be produced by the same degree of boiling, and under the same weight of the atmosphere. With regard to the first circumstance, it is observed, that water, when it begins to boil, has not attained to its greatest degree of heat, which is known by its bubbling or foaming from the bottom of the vessel, and over the whole surface of the water, with the greatest violence which it is capable of acquiring; and in this state the water discovers an augmentation of heat more than one degree above the heat it had when it began to boil. The temperature of water which boils with vehemence should, therefore, be the standard of the fixed point of thermometers: nevertheless it is to be considered farther, that this degree of heat with which water violently boils, is invariably the same, only under a given pressure of the atmosphere; but if the pressure be diminished or increased, the boiling heat is diminished or increased. It is well known that water, placed under the exhausted receiver of an air-pump, will be converted into steam with a degree of heat far inferior to that which is necessary to its boiling in the open air; and under the pressure of its own vapour, confined in Papin's digester, it is said to sustain a degree of heat, without boiling, far exceeding that which, in the open air, would convert it into steam. Hence it follows that, in climates where the pressure of the atmosphere is liable to considerable change, the heat of boiling water, in open air, will be different at different times. Consequently thermometers, made in different states of the barometer, will disagree; unless allowance has been made for the effect of the variation of the barometer upon accurate principles. That the heat of boiling was variable, according to the pressure of the atmosphere, seems to have been known to Fahrenheit as early as the year 1724. See *Phil. Transf. N<sup>o</sup> 385.*

Some time after this period, Messrs. le Monnier and Cassigni (*Mem. de l'Acad. des Sc. for 1740*) made some decisive observations, in order to shew that this quantity was very considerable.

M. de Luc, in 1762, made a much more complete series of experiments, which he has described and reduced into a system in his *Récherches sur les Mod. de l'Atmosphère*, vol. i. p. 382, &c. vol. ii. p. 338, &c. and these have been since verified by sir George Shuckburgh, in 1775 and 1778. See *Phil. Transf. vol. lxxix. part ii. p. 362, &c.*

M. de Luc fixes the boiling point of his thermometer when the barometer is at 27 Paris, or 28.75 English inches, that being its mean height at Geneva. He divides the fundamental interval, *i. e.* the whole extent of the scale, between melting ice and boiling water, after the French manner, into eighty equal parts; and by a great number of experiments

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periments on the heat of boiling water, at different heights above the level of the sea, he hath found, that the height of his thermometer, plunged in boiling water, may be expressed, in all states of the barometer, by the following formula, *viz.*

$$\frac{99}{200000} \log. y - a = T : \text{ in which } y \text{ denotes the height of}$$

the barometer in sixteenths of a Parisian line, T the height of a thermometer, plunged in boiling water, above melting ice, in hundredths of a degree of his scale; and *a* the constant number 10387.

By logarithms he always means the tabular or Briggsian logarithms, and considers the seven figures given by the tables, besides the index, as integral figures, *i. e.* he considers the eighth figure of the logarithm as standing in the place of units. But as it is more usual with mathematicians, and, in general, more convenient, to consider all the figures after the index as decimals, the number which M. de

Luc expresses by  $\frac{99}{200000} \log. y$ , would in that case be

$$\frac{99 \times 100}{2} \log. y; \text{ or } 99 \times 50 \log. y. \text{ However, in the}$$

sequel, M. de Luc's notation is retained.

Now if care were taken by the above formula, or in any other way, to adjust the boiling point to the main height of the barometer in every country, the instruments of the same country would always be consistent; but those of different countries would still disagree; that is, they would express the same temperature differently, though their similar intervals should be similarly divided; for in every scale, the number of degrees above or below melting ice, by which any given temperature is expressed, will be as the value of each degree inversely; that is, if each be a given part of the fundamental interval, as the value of the fundamental interval inversely; but if the degrees of different scales be different parts of the fundamental intervals, as the value of the fundamental interval inversely, and the number of degrees contained in it directly.

In order, therefore, to compare the thermometers of different countries, the proportions of their fundamental intervals to each other must be ascertained, or we must have some means of finding, upon one scale, the place of the boiling point of another. For this purpose, a general solution is requisite of the following problem, *viz.* the fundamental interval being given for a given height of the barometer, to find the fundamental interval for any other given height of the barometer. The solution is furnished by M. de Luc's researches; and his formula, above given, is reduced to English measures, and adapted to English instruments, by Dr. Horsley. As the subject is curious and important, we shall subjoin the process he has pursued for this purpose. It is but seldom that the barometer in this country stands so low as 27 Paris inches. Its main height upon the plain country about London is near 30 English inches. It may, therefore, be proper for the London workmen to fix their boiling point when the barometer is at 30 inches. Fahrenheit's division of the scale, which makes 180 degrees between melting ice and boiling water, and places the point 0 at the 32d degree below melting ice, may be retained: and the thermometer thus constructed is called by Dr. Horsley, Bird's Fahrenheit, because Mr. Bird, he apprehends, is the first workman who took the pains to attend to the state of the barometer in making thermometers, and has always fixed the boiling point when his barometer has stood at 30 inches.

T, then, being put for the height of a thermometer

plunged in boiling water, above melting ice, in 1000ths of a degree of De Luc's scale, in any given state of the barometer; let  $\ominus$  denote the same height in 1000ths of a degree of Bird's Fahrenheit; put *y* for the height of the barometer, in 16ths of a Paris line; *v*, for its height in Paris lines; *x*, in 10ths of a Paris inch; *z*, in 10ths of an English inch; and for 10387 put *a*; for 16, *b*; for 10, *c*; for 12, *d*; and let E and F represent numbers expressing the proportion of the English foot to the French foot.

M. de Luc hath found that, whatever be the value of *y*,

$$\frac{99}{200000} \log. y - a = T. \text{ But } \log. y = \log. v + \log. b;$$

$$\text{and } \log. v = \log. x + \log. d - \log. c; \text{ and } \log. x = \log. z + \log. E - \log. F; \text{ therefore } \log. y = \log. z + \log.$$

$$E + \log. d + \log. b - \log. F - \log. c; \text{ and } \frac{99}{200000} \log.$$

$$z + \frac{99}{200000} \log. E + \log. d + \log. b - \log. F - \log. c$$

$$- a = T. \text{ But } \frac{99}{200000} \log. E + \log. d + \log. b - \log.$$

$$F - \log. c - a = - 4171.55; \text{ the French foot being}$$

$$\text{to the English as 2.1315 to 2. Therefore } \frac{99}{200000} \log. z$$

$$- 4171.55 = T; \text{ and } \frac{99}{20000000} \log. z - 41.7155 =$$

$$\frac{T}{100} = \text{the height of the thermometer, plunged in boiling}$$

water, above melting ice, in degrees of De Luc's scale, when the height of the barometer in tenths of an English inch, is *z*. For *z* write 300: then  $\frac{T}{100} = 80.902$ ; which

is therefore the height of the thermometer, in boiling water, above melting ice, in degrees of De Luc's scale, when the barometer is at 30 inches English. And in the same state of the barometer, the height of the thermometer plunged in boiling water, above melting ice, in degrees of Bird's Fahrenheit, or  $\frac{\ominus}{100}$ , is 180. Hence the numbers T and  $\ominus$

are in the constant proportion of 809 and 1800, whatever be the value of *z*. For the change produced in the heat of boiling water, by any change of *z*, being always the same for both thermometers, the temperature expressed by T in parts of one scale is always the same, as  $\ominus$  ex-

presses in parts of the other; and therefore putting  $\frac{1}{L}$

and  $\frac{1}{B}$  for the values of the 1000th part of a degree of the

scales of De Luc and Bird respectively, the fractions  $\frac{T}{L}$ ,

$\frac{\ominus}{B}$  are always equal, and T,  $\ominus$  are in the constant propor-

tion of the invariable numbers L, B: consequently, when the proportion of T and  $\ominus$  is determined for any particular value of *z*, it is found generally for all: consequently T :  $\ominus$

$$:: 809 : 1800. \text{ And } T = \frac{809}{1800} \ominus = \frac{899}{2000} \ominus \text{ very nearly}$$

in all values of *z*: and substituting this value for T in the equation

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equation exhibiting the relation between  $z$  and  $T$ , we have, for the relation between  $z$  and  $\Theta$ ,  $\frac{99}{20000000} \log. z - 41.7155 = \frac{899}{2000 \times 100} \Theta$ : or,  $\frac{99}{10000 \times 899} \log. z - 92.804 = \frac{\Theta}{100}$  = the height of the thermometer in boiling

water, above melting ice, in degrees of Bird's Fahrenheit, when the height of the barometer in tenths of an English inch, is  $z$ . And thus M. de Luc's formula, for the variation of the boiling point, is adapted to English instruments, and reduced to English measures of length.

For  $z$  write 287.7525, the length of 27 French inches in tenths of an English inch, and  $\frac{\Theta}{100}$ , the height of De Luc's boiling point above melting ice, in degrees of Bird's Fahrenheit, comes out 177.989. Hence M. de Luc's boiling point falls upon 209.989 of Bird's scale, *i. e.* upon 210 very nearly, or insensibly more than two degrees below Bird's point of boiling. But as 899 is a troublesome divisor, the computation will be more easy and expeditious, by writing for  $\frac{11}{1000000} \log. z$ ,  $s$ . Then  $s + \frac{1}{900} s - 92.804 = \frac{\Theta}{100}$  very nearly. Upon these principles Dr. Horsley has

computed the table following, for finding the heights to which a good Bird's Fahrenheit will rise, when plunged in boiling water, in all states of the barometer, from 27 to 31 English inches; which will serve, among other uses, to direct instrument-makers in making a true allowance for the effect of the variation of the barometer, if they are obliged to finish a thermometer, when the barometer is above or below 30 inches; though it is best to fix the boiling point when the barometer is at the height prescribed.

Equation of the Boiling Point.

Barometer.	Equation.	Difference.
31.0	+ 1.57	0.78
30.5	+ 0.79	0.79
30.0	0.00	0.80
29.5	- 0.80	0.82
29.0	- 1.62	0.83
28.5	- 2.45	0.85
28.0	- 3.31	0.86
27.5	- 4.16	0.88
27.0	- 5.04	

The numbers in the first column of this table express heights of the quicksilver in the barometer in English inches and decimal parts: the second column shews the equation to be applied, according to the sign prefixed, to 212° of Bird's Fahrenheit to find the true boiling point for every such state of the barometer. The boiling point for all intermediate states of the barometer may be had with sufficient accuracy by taking proportional parts, by means of the third column of differences of the equations. (See Phil. Transf. vol. lxiv. part i. art. 30. See also an excellent paper on this subject by Dr. Maskelyne, in the Phil. Transf. vol. lxiv. part i. art. 20.) In the following table we have the result of fifteen different observations

made by Sir George Shuckburgh (*ubi supra*) compared with the result of M. de Luc's rules.

Height of the Barometer reduced to the same Temperature of 50°.	Mean Boiling Point by Observation.	Boiling Point by De Luc's Rules.
Inch.	Deg.	Deg.
26.498	207.07	208.54
27.241	208.64	208.84
27.954	209.87	210.03
28.377	210.50	210.81
28.699	211.27	211.34
28.898	211.50	211.67
28.999	211.60	211.85
29.447	212.55	212.74
29.805	212.95	213.15
30.008	213.22	213.47
30.207	213.58	213.79
30.489	214.15	214.23
30.763	214.37	214.66
30.847	214.83	214.79
30.957	214.96	214.96

Sir George Shuckburgh has also subjoined the following general table for the use of artists in constructing the thermometer, both according to his own observations, and those of M. de Luc.

Height of the Barom.	Correct. of the Boiling Point.	Difference.	Correct. accord. to M. de Luc.	Difference.
Inch.	Deg.		Deg.	
26.0	- 7.09		- 6.83	.90
26.5	- 6.18	.91	- 5.93	.89
27.0	- 5.27	.91	- 5.04	.88
27.5	- 4.37	.90	- 4.16	.87
28.0	- 3.48	.89	- 3.31	.86
28.5	- 2.59	.89	- 2.45	.86
29.0	- 1.72	.87	- 1.62	.83
29.5	- 0.85	.87	- 0.80	.82
30.0	0.00	.85	0.00	.80
30.5	+ 0.85	.85	+ 0.79	.79
31.0	+ 1.69	.84	+ 1.57	.78

The Royal Society, fully apprized of the importance of adjusting the fixed points of thermometers, appointed a committee of seven gentlemen to consider of the best method for this purpose; and their report is published in the Phil. Transf. vol. lxvii. part ii. art. 37. From a variety of experiments and observations, relating to this subject, the committee have deduced the following practical rules, which they recommend in adjusting the fixed points of thermometers. The most accurate way of adjusting the boiling point is, not to dip the thermometer into the water, but to expose it only to the steam, in a vessel closed up in the manner represented in *Plate XVI. Pneumatics, fig. 6.* where *A B b a* is the vessel containing the boiling water, *D d* the cover, *E* a chimney made in the cover intended to carry off the steam, and *M m* the thermometer passed through a hole in the cover. In the pursuit of this method the following particulars must be regarded: the boiling point must be adjusted when the barometer is at 29.8 inches; unless the operator corrects the observed point in the manner

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manner directed in the sequel of this article. The ball of the thermometer must be placed at such a depth within the pot, that the boiling point may rise very little above the cover; and the surface of the water in the pot should be at least one or two inches below the bottom of the ball. Care must be taken to stop up the hole in the cover through which the tube is inserted, and to make the cover fit pretty close, so that no air shall enter into the pot that way, and that not much steam may escape. A piece of thin flat tin-plate must also be laid on the mouth of the chimney, so as to leave no more passage than what is sufficient to carry off the steam.

If the artist pleases, he may tie each corner of this plate by a string to prongs fixed to the chimney, and standing on a level with the plate, as it will be thus always kept in its place.

Fig. 7. is a perspective view of the chimney and tin-plate; ABCD is the plate, E the chimney, Ff, Gg, Mm, and Nn, the prongs fastened to the chimney, to which the four corners of the plate are to be tied by the strings AF, BG, CM, and DN; the ends F, G, M, and N, of the prongs must be on a level with the plate, and the strings should not be stretched tight. The chimney ought not to be less than half a square inch in area, and not less than two or three inches in length. The cover should be made to take on and off easily, and a ring of woollen cloth may be placed under it, so as to lie between it and the top of the pot. The hole in the cover may be flopped up by a cork, with a hole bored through it, big enough to receive the tube, and then cut into two, parallel to the length of the hole. Another method, more convenient in use, but not so easily made, is represented in fig. 8. which exhibits a perspective view of the apparatus: Aa is the cover, H the hole through which the thermometer is passed, Bb a flat piece of brass fixed upon the cover, and DdEe a sliding piece of brass, made so as either to cover the hole H, or to leave it uncovered, as in the figure, and to be tightened in either position by the screw s sliding in the slit Mm; also in the edge Dd, to enclose the tube of the thermometer: pieces of woollen cloth should also be fastened to the edges Bb and Dd, and also to the bottom of the sliding-piece DdEe, unless that piece and the cover are made sufficiently flat to prevent the escape of the steam. In order to keep the thermometer suspended at the proper height, a clip may be used like that represented in fig. 9. which, by the screw s, must be made to embrace the tube tightly, and may rest on the cover.

Another method, which is rather more convenient, when the top of the tube of the thermometer is bent into a right angle, in the manner often practised at present for the sake of more conveniently fixing it to the scale, is represented in fig. 10.: GgFf is a plate of brass standing perpendicularly on the cover, and L/Nn a piece of brass bent at the bottom into the form of a loop, with a notch in it, so as to receive the tube of the thermometer, and to suffer the bent part to rest on the bottom of the loop; this piece must slide in a slit Kk, in the plate L/Nn, and be tightened at any height by the screw T.

Moreover, it is best to make the water boil pretty briskly, as otherwise the thermometer is apt to be a great while before it acquires its full heat, especially if the vessel is very deep; and the observer should wait at least one or two minutes after the thermometer appears to be stationary, before he concludes that it has acquired its full height.

Another way of adjusting the boiling point is to try it in a vessel of the same kind as the former, only with the water

rising a little way, viz. from one to three or four inches above the ball, taking care that the boiling point shall rise very little above the cover. In this method there is no need to cover the chimney with the tin-plate, and there is less need to make the cover fit close, unless to prevent the operator from being incommoded with the steam. The height of the barometer in this method is 29½ inches.

It will be convenient to have two or three pots of different depths for adjusting thermometers of different lengths. A third way of adjusting the boiling point is to wrap several folds of linen rags or flannel round the tube of the thermometer, and to try it in an open vessel, taking care to pour boiling water on the rags, in order to keep the quicksilver in the tube as nearly of the heat of boiling water as possible. In this method the barometer should be at 29.8 inches; the water should boil fast, and the thermometer should be held upright, with its ball two or three inches under water, and in that part of the vessel where the current of water ascends.

Whichever of these methods of adjusting the boiling point is used, it is not necessary to wait till the barometer is at the proper height, provided the operator will take care to correct the observed height according to the following table.

Height of the Barometer when the Boiling Point is adjusted according to the		Correction in 1000ths of the Interval between 32° and 212°	Height of the Barometer when the Boiling Point is adjusted according to the		Correction in 1000ths of the Interval between 32° and 212°.
1ft or 3d Method.	2d Method.		1ft or 3d Method.	2d Method.	
	30.60	10	29.69	29.39	1
		9	58	28	2
30.71	53	8	47	17	3
	41	7	36	06	4
59	29	6	25	28.95	5
48	18	5	14	84	6
	07	4	03	73	7
	95	3	28.92	62	8
14	84	2	81	51	9
03	73	1	70		10
29.91	61	0	59		11
80	50				

In using this table, seek the height of the barometer in the column answering to the method of adjusting the boiling point, the corresponding number in the third column shews how much the point of 212° must be placed above or below the observed point: e. gr. suppose the boiling point to be adjusted in them when the barometer is at 29 inches, and that the interval between the boiling and freezing points is 11 inches; the nearest number to 29 in the left-hand column is 29.03, and the corresponding number in the table is 7 higher, and therefore the mark of 212° must be placed higher than the observed point by  $\frac{7}{1000}$ ths of the interval between boiling and freezing, i. e. by  $\frac{11 \times 7}{1000}$ , or .077

of an inch. This method of correcting the boiling point is not strictly just, unless the tube is of an equal bore in all its parts; but the tube is seldom so unequal as to cause any sensible error, where the whole correction is so small. The trouble of making the correction will be abridged by a diagonal scale, such as is represented in fig. 10.

Although it is of no great consequence what kind of water is used in adjusting the boiling point, so that it is not salt,

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salt, or, if it be hard, that it should be kept boiling at least ten minutes before it is used; yet the committee recommend, for the adjustment of thermometers intended for nice experiments, to employ rain or distilled water, and to perform the operation in steam.

It is observed, that though the boiling point be placed so much higher on some of the thermometers now made than on others, yet this does not produce any considerable error in the observations of the weather, at least in this climate; for an error of  $1\frac{1}{2}^{\circ}$  in the position of the boiling point, will make an error only of half a degree in the position of  $92^{\circ}$ , and of not more than a quarter of a degree in the point of  $62^{\circ}$ .

It is only in nice experiments, or in trying the heat of hot liquors, that this error in the boiling point can be of much signification.

In adjusting the freezing, as well as the boiling point, the quicksilver in the tube ought to be kept of the same heat as that in the ball. When the freezing point is placed at a considerable distance from the ball, the pounded ice should be piled to such a height above the ball, that the error which can arise from the quicksilver in the remaining part of the tube, not being heated equally with that in the ball, shall be very small, or the observed point must be corrected on that account, according to the following table.

Heat of the Air.	Correction.
42°	.00087
52	.00174
62	.00261
72	.00348
82	.00435

The correction in this table is expressed in 1000th parts of the distance between the freezing point and the surface of the ice: e. g. if the freezing point stands seven inches above the surface of the ice, and the heat of the room is  $62^{\circ}$ , the point of  $32^{\circ}$  should be placed  $7 \times .00261$ , or  $.018$  of an inch lower than the observed point. A diagonal scale will facilitate this correction.

The committee observe, that in trying the heat of liquors, care should be taken that the quicksilver in the tube of the thermometer be heated to the same degree as that in the ball; or if this cannot be done conveniently, the observed heat should be corrected on that account; for the manner of doing which, and a table calculated for this purpose, we must refer to their excellent report in the Phil. Transf. vol. lxxvii. part ii. art. 37.

Several experiments made by governor Hutchins, at Albany Fort, in Hudson's Bay, in 1782, in pursuance of a method suggested by Dr. Black and Mr. Cavendish, and for which he obtained Sir Godfrey Copley's medal from the Royal Society in 1783, have not only confirmed the observations before made, relative to the solid state into which quicksilver can be brought by cold, its metalline splendour and polish when smooth, its roughness and crystallization where the surface was unconfined, its malleability, softness, and dull found when struck; but have also clearly demonstrated, that its point of congelation is no lower than  $-40^{\circ}$ , or rather  $-39^{\circ}$ , of Fahrenheit's scale; that it will bear, however, to be cooled a few degrees below that point, to which it jumps up again on beginning to congeal; and that its rapid descent in a thermometer, through many hundred of degrees, when it has once passed the above-mentioned

limit, proceeds merely from its great contraction in the act of freezing. See Phil. Transf. vol. lxxiii. part ii. art. \*20, 20, 21.

**THERMOMETERS, Observations on the Construction of.** It is absolutely necessary that those who would derive any advantage from these instruments, should agree in using the same liquor, and in determining, according to the same method, the two fundamental points. If they agree in these fixed points, it is of no great importance whether they divide the interval between them into a greater or less number of equal parts. The scale of Fahrenheit, in which the fundamental interval between  $212^{\circ}$ , the point of boiling water, and  $32^{\circ}$ , that of melting ice, is divided into 180 parts, should be retained in the northern countries, where Fahrenheit's thermometer is used: and the scale, in which the fundamental interval is divided into 80 parts, will serve for those countries where the thermometer of M. de Reaumur is adopted. But no inconvenience is to be apprehended from varying the scale for particular uses, provided care be taken to signify into what number of parts the fundamental interval is divided, and the point where 0 is placed.

With regard to the choice of tubes, it is most desirable to have them exactly cylindrical through their whole length. See *Mercurial THERMOMETER.*

The capillary tubes are preferable to others, because they require less bulbs, and they are also less brittle, and more sensible. Those of the most convenient size for common experiments are such as have their internal diameter about the fourth of a line: and those made of thin glass are better than others, as the rise and fall of the mercury may be more distinctly perceived. The length of nine inches will serve for all common occasions; but for particular purposes, the length both of the tubes and of the divisions should be adapted to the uses for which they are designed.

In determining the best size of the balls or bulbs, it has been usual to compare new tubes with such thermometers as are well proportioned. But M. Durand has proposed a formula for finding the proportion which the balls ought to bear to their respective tubes. With this view he expresses the length of the tube, measured in diameters of itself, by  $a$ ; the whole capacity of the ball and tube by  $c$ ; the capacity of the fundamental interval, expressed in the same parts with the whole capacity, by  $d$ ; the number of degrees of the fundamental interval by  $m$ ; the number of other degrees which the scale is to contain, besides those of the fundamental interval both above and below it, by  $n$ ; and the diameter of the ball measured in diameters of the tube by  $b$ : and  $b =$

$$\sqrt[3]{\frac{2}{3} a \times \frac{c m}{d \times m + n}} - 1. \quad \text{For two cylinders having}$$

equal bases being as their heights,  $m : n :: d : \frac{d n}{m}$ , which is

the capacity of that part of the tube which exceeds the fundamental interval, to which adding  $d$ , that interval,

we have the total capacity of the tube  $= \frac{d n}{m} + d$ , or

$\frac{d n + d m}{m}$ . Subtracting this from  $c$ , we shall have the

capacity of the ball  $= c - \frac{d n + d m}{m} = \frac{c m - d m - d n}{m}$ .

If this quantity be divided by the capacity of the tube, the quotient will shew how often the capacity of the ball contains that of the tube; and this quotient is  $=$   
 $\frac{c m - d m - d n}{c m}$

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$\frac{cm - dm - dn}{dm + dn}$ . Consequently the ball is equal to as many

cylinders having  $a$  diameters of the tube, for their respective height, and  $1$  diameter for the base, as are contained in this last quotient; and, therefore, its cylindric solidity expressed in the cylindric solidities of the tube will be  $= a \times$

$\frac{cm - dm - dn}{dm + dn}$ . But the diameter of this ball is equal to

the base of the cylinder in which it may be inscribed, and the solidity of this cylinder is equal to  $\frac{2}{3}$ ds the solidity of the circumscribing sphere. Consequently the solidity of this cylinder

will be  $= \frac{2}{3} a \times \frac{cm - dm - dn}{dm + dn}$ ; and the diameter of

its base equal to the diameter of the ball, will be  $=$

$$\sqrt[3]{\frac{2}{3} a \times \frac{cm - dm - dn}{dm + dn}} \text{ or } \sqrt[3]{\frac{2}{3} a \times \frac{cm}{d \times m + n}} - 1.$$

It is evident that, *ceteris paribus*, the larger the bulb is, in proportion to the diameter of the cavity of the tube, or the narrower the latter is in proportion to the former, the greater will the motion of the surface of the fluid be in the tube. But it must be observed, that when the bulb is very large, the thermometer will not easily arrive at the precise temperature of any place, wherein it may be situated. Some persons, in order to give the bulb a greater surface, and of course to render it more capable of readily attaining a given temperature, have made it not globular, but cylindrical (which shape was adopted by Fahrenheit), or flat, or bell-like, &c.; but those shapes are improper, because they are liable to be altered by the varying gravity of the atmosphere, consequently those thermometers cannot be accurate. The bulb should be clean and colourless; since coloured surfaces are apt to be partially heated by a strong light. If you take two equal thermometers, and paint the bulb of one of them black, or of any dark colour, and expose them both to the sun; the mercury in that whose bulb is painted will rise several degrees higher than in the other: even a strong day-light, independently of the direct rays of the sun, will affect them differently. The ball of the thermometer should not be in contact with the substance of the scale, lest it should be influenced by the temperature of that substance.

When a proper tube and ball are procured, and their proportion ascertained, the next object which requires peculiar attention is that of filling the thermometer. For this purpose the tubes should be clean and dry, and the mercury very pure. (See MERCURY and BAROMETER.) The mercury may be introduced into the tube by means of a kind of reservoir fixed at the top of it, and proportioned in size to the bulk of the ball, or by rolling upon the tube a slip of fine paper, about two or three inches broad. In order to clear the tube of its air and moisture, it should be held over a gentle fire, so disposed, as that it may heat at once the whole extent of the tube, till its heat becomes too great for the operator's hand to bear, who therefore uses a glove or nippers for this purpose; care being taken that the ball is not heated at the same time. After the inclosed air is thus rarefied, and the particles that might obstruct the free motion of the mercury are made to float in vapours within the bore of the tube, the tube is to be held upright, and the ball suddenly heated, by which means the air contained in it will be dilated, and carry off the impurities of the tube, so that it will be rendered clean and free from air. When the ball is heated to a considerable degree, the mercury may be poured

into the reservoir fixed at the top of the tube, through a small corner of the paper. When the reservoir is almost full, the ball should be withdrawn from the fire, and the air will then be condensed, and the space left by it will be soon occupied by the mercury. By alternately heating and cooling the ball, it may thus be filled with mercury; but when it is nearly full, the mercury contained in it must be made to boil, by placing it over burning coals, in order to purge it of its air. However, as a small quantity of air will be left in the ball after this operation, it will be expedient to remove the mercury, which remains in the reservoir, immediately after the thermometer is withdrawn from the fire; and thus the whole column, un supplied with mercury from the reservoir, will descend into the ball by the condensation of that which is contained in it, and the tube being empty, the small bubble of air will escape. Let the tube be again heated successively through its whole length, commencing from the bottom, and preserving the heat of the ball, that the mercury may occupy it entirely, and no air be allowed to enter. During this operation, when the mercury of the thermometer begins to appear in the reservoir, let the mercury contained in a paper funnel be poured into it in such a quantity as will more than fill the thermometer, which is then to be removed from the fire. The mercury of the tube, and that discharged from the funnel, will unite, and pass together into the thermometer, and thus it will be wholly filled. In this state it may be left for any time at pleasure, without any apprehension of its imbibing either air or moisture. Nothing now remains but to get rid of the superfluous quicksilver, and to seal the tube. For this purpose the thermometer is held in the hand and heated, till a drop of mercury falls out of it, and is then left to recover the temperature of the air; by which means there will remain at the top of the tube a small empty space. Then with a blow-pipe and the flame of a candle, let the end of the tube be formed into a fine point, of such a length as will admit of its being properly sealed. When this preparatory process is completed, let the thermometer be gradually plunged into boiling water, so that the superfluous mercury may issue from it slowly; and when it ceases to be discharged, withdraw the thermometer from the boiling water; wipe it dry, and as soon as possible, put the ball of it over a small fire, covered with ashes, and previously prepared for the purpose. In this part of the operation, it is necessary to be quick, that the mercury may not have time to condense, and the air enter into the tube. In this state the thermometer may be left to heat, till it parts with more or fewer drops of the mercury, according to the proportion which the length of the tube bears to that of the scale applied to it. The thermometer is then sealed, by melting only the end of the point above mentioned, and at the same instant withdrawing it from the fire.

The method of filling the thermometer with a paper tube, or funnel, is as follows. Let the ball be heated, so that the mercury may rise to the top of the tube; whilst it approaches it, apply the tube of paper to the end of the tube, so that it may serve for a reservoir. The thermometer being placed near the fire, so that it may always preserve the same degree of dilatation, take some well purified mercury in a paper cornet, and communicate a little more heat to the ball. When the mercury rises, and forms a small drop at the end, pour the mercury of the cornet into the reservoir of paper, and withdraw the ball from the fire. Having removed the paper reservoir, place the ball again over the fire, and seal the point of the tube at the moment when the mercury rises to it, and withdraw the thermometer from the fire. This operation will be acquired by use.

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Thermometers that are desired for measuring great degrees of heat, require to be filled with particular precautions, which M. de Luc has minutely described.

When the thermometer is filled and sealed, nothing more is necessary than to mark the two fixed points, graduate the scale, and attach it to a proper frame. See de Luc's *Récherches*, &c. vol. i. p. 393, &c.

The frame may be made of any substance, or kind of wood, at pleasure: and the degrees may be marked on metal or wood, or paper, or ivory, &c.; but such substances should be preferred for the scales of thermometers as are not apt to be bent or shortened, or otherwise altered by the weather, especially if the instruments are not defended by a glass case, or by a box with a glass face. Thermometers for indicating the temperature of the atmosphere need not have scales that are much extended; if they go as high as 120° it is sufficient. The lower degrees may be carried down as low as may be necessary for the cold of any particular climate. The mercurial thermometer need not be graduated lower than 40° below 0, because at about that degree mercury ceases to be fluid. The spirit thermometer may be graduated lower, if necessary.

Thermometers used for observation, must be situated in the open air out of the house, and at the distance of a foot (at least) from the wall, and where the light of the sun may not fall directly upon them. For chemical purposes, the bulbs and part of the tubes of the thermometers should project some way below the scales, that they may be dipped in liquids, mixtures, &c. For other purposes, as for botanical observations, hot-houses, brewing manufactories, baths, &c. the thermometers must be made longer or shorter, or narrower; and particular directions may be given with regard to the scales and other appendages.

Great inconvenience has attended the use of various kinds of thermometers with different graduations. Kirwan proposed to lay all these aside, and to construct a general one, beginning at the congelation of mercury, and terminating at the boiling of water, and divided into 250°. Mr. Murray of Edinburgh has since suggested, that it would be convenient to form a scale whose extreme points should be the temperatures of freezing and boiling mercury, both which are now capable of being accurately ascertained, and to divide this scale into 1000°.

**THERMOMETERS, Experiments with.** We shall here insert a table of some observations made with the thermometers of Fahrenheit, Reaumur, sir Isaac Newton, and Dr. Hales.

### *Observations by Fahrenheit's Thermometer.*

At	Deg.		
	600	Mercury boils	}
	546	Oil of vitriol boils	
	242	Spirit of nitre boils	
	240	Lixivium tartari boils	
	213	Cow's milk boils	
	212	Water boils.	
	206	Fresh human urine boils.	
	190	Brandy boils.	
	174	Alcohol boils.	
	176	— according to Muschenbroeck.	
	156	Serum of blood and white of eggs hardens.	}
	146	Killing heat for animals, in a few minutes.	
	108	A hen hatching eggs, but seldom so hot.	
From	107	Heat of skin in ducks, geese, hens, pigeons,	
to	103	partridges and swallows.	
At	106	Heat of skin in a common ague and fever.	

	Deg.	
From	103	}
to	100	
From	99	}
to	92	
At	97	Heat of a swarm of bees.
	96	}
	80	
	74	Butter begins to melt.
	64	}
	48	
	43	Oil of olive begins to thicken and grow opaque.
	32	}
	30	
	28	Milk freezes.
	28	Urine and common vinegar freezes.
	25	Blood out of the body freezes.
	20	}
	7	
	5	}
	4	
	0	}
	- 39	

Martine's Essays, p. 284, &c.

We must here observe, that the heat of a hen hatching chickens is placed, by this table, at 108° of Fahrenheit's thermometer: but it appears from M. Reaumur's experiments, that eggs will hatch in a heat no greater than that of the human skin. See **HATCHING**.

### *2. Observations by Reaumur's Thermometer.*

	97 $\frac{1}{2}$	Answers to the heat of boiling water.
	80	Spirit of wine in Reaumur's thermometer boils.
At	29 $\frac{3}{4}$	}
	10 $\frac{3}{4}$	
	0	}
	14 $\frac{1}{2}$	

### *3. Observations by sir Isaac Newton's Thermometer.*

	34	Water boils vehemently.
	28 $\frac{6}{r}$	Heat between water boiling and wax melting.
	24	Heat of water on which floating wax melts.
	20 $\frac{2}{r}$	}
	17	
	14 $\frac{1}{r}$	}
	12	

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6	} Heats of the air in summer.	
5		
4		
4		
3	} Heats of the air in spring and autumn.	
2		
2		
1	} Heat of the air in the winter.	
0		
0		
	Water begins to freeze.	
		Phil. Trans. Abr. vol. iv. part ii. p. 1.
	4. <i>Observations by Dr. Hales's Thermometer.</i>	
146 $\frac{1}{2}$	Answers to the heat of boiling water.	
100	} Heat of water on which floating wax begins to melt.	
88		
	Hottest sunshine in 1727.	
85	} Scorching heat of a hot-bed of horse-dung, and also the heat of blood in high fevers.	
64		
	} Heat of the blood of animals; whence the heat of the blood to that of boiling water is as 14.27 to 33.	
58		
	Heat of urine.	
56	} Due healthy heat of a hot-bed of horse-dung in February, that of the open air being 17 $\frac{1}{2}$ , and nearly the bosom heat, and heat for hatching of eggs.	
55		
	Heat of milk from the cow.	
54	External heat of the body.	
50	Common noon heat in the sun in July.	
38	Mean heat of the air in the shade in July.	
From 30	} May and June heat; and the most genial heat for most plants, in which they flourish and grow most.	
to 17		
From 20	} Autumnal and vernal heat.	
to 10		
From freezing point	} Winter heat.	
to 10		
18	Temperate point.	
31	The most kindly heat for melon-thistle.	
29	_____ ananas or pine-apple.	
26	_____ pimento.	
24	_____ euphorbium.	
21 $\frac{1}{2}$	_____ cereus.	
19	_____ aloë.	
16 $\frac{1}{2}$	_____ Indian fig.	
14	_____ ficoides.	
12	_____ oranges.	
9	_____ myrtle.	
0	Fresh water just freezing.	

Hales's Statical Ess. vol. i. p. 58, &c.

For other similar observations, see FREEZING Mixture, and HEAT.

See on the general subject of thermometers, Martine's *Essays, Medical and Philosophical*, printed at London in 1740, 8vo. Desaguliers's *Exp. Phil.* vol. ii. p. 289, &c. Muschenbroeck's *Int. ad Phil. Nat.* vol. ii. p. 625, &c. ed. 1762. De Luc's *Récherches sur les Modifications de l'Atmosphère*, tom. i. part ii. c. 2. Nollet's *Leçons de Physique*, tom. iv. p. 375, &c.

THERMOMETERS for particular Uses. In 1757, the right hon. the earl of Cavendish presented to the Royal Society an account of a curious construction of thermometers, of two different forms; one contrived to shew the greatest de-

gree of heat, and the other the greatest cold, that may happen at any time in a person's absence. The first consists of a cylinder of glass joined to a tube, and differs from the common sort only in having the top of the stem drawn out into a capillary tube, which enters into a glass ball C (*Plate XVI. Pneumatics, fig. 11.*) joined on to the stem at the place where it begins to be contracted. The cylinder, and part of the tube, are filled with mercury, the top of which shews the common degrees of heat as usual. The upper part of the tube above the mercury is filled with spirit of wine, and some of the same liquor is left in the ball C, so as to fill it almost to the top of the capillary tube.

When the thermometer rises, the spirit of wine will be driven out of the tube, and will fall into the ball C. When the thermometer sinks again, as the spirit cannot be returned back from the ball, the top of the tube will remain empty, and the length of the empty part will be proportional to the fall of the thermometer. Consequently, by means of a proper scale, the top of the spirit of wine will shew how many degrees it has been higher than when observed, which being added to the present height, will give the greatest degree of heat it has been at. To fit this thermometer for a new observation, it is necessary to fill the upper part of the tube with spirits, by inclining the instrument till the spirits in the ball C cover the end of the capillary tube; for if the cylinder is then heated, by applying the hand to it, or by the flame of a lamp held at some distance, till the spirits rise to the top of the tube, and run over into the ball C, and is then suffered to cool in the same position, the tube will remain full of spirits, and the thermometer will be fitted for a new experiment.

The scale of degrees at top, which shews the descent of the thermometer from the highest point it has arrived at, ought not, in strictness, to be the same at all times of the year; for these degrees exceed the common degrees of heat pointed out by the top of the mercury, as much as the column of spirit of wine expands, and therefore are greatest when that column is so; *i. e.* when the greatest heat to which the instrument has been exposed is least. A difference of 30 degrees of Fahrenheit's scale, in the greatest rise of the thermometer, would require the scale to be altered one sixtieth part; and the error arising from making use of the same scale, will be about one-sixth of a degree, if the thermometer is observed when it has fallen ten degrees.

In the thermometer here described, the bore of the tube is about 0.027 inches; and one inch of it contains two grains of mercury, and answers to about ten degrees, the cylinder containing about 2280 grains. When the scale of degrees is large, the cylinder must be of considerable size. The quicksilver in the ball C serves to supply the tube, in case any of it should be driven into the ball by the thermometer's being exposed to too great a heat.

If the weight of the mercury be thought inconvenient, it may be avoided by the construction in *fig. 12.* where the bottom of the tube is bent so as to point upwards, and is joined to a ball A, which communicates with a cylinder placed above it. It is in all other respects the same as the former instrument. It is filled with spirits of wine and mercury; the quantity of the latter being sufficient to fill the whole tube and the ball A.

The thermometer for shewing the greatest degree of cold that happens in any place during the time the instrument is left in it, is represented in *fig. 13.* The tube is bent into the shape of a siphon, of unequal legs, standing parallel to one another; the top of the shorter leg is bent to a right angle, and opens into a ball A, which, by means of a short bent tube on the opposite side, communicates with a cylin-

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der standing parallel to the legs of the siphon, and pointing downwards. This cylinder contains the greatest part of the fluid, and is added only to make the thermometer more sensible than it would be, if the ball A was made of a sufficient size to contain the proper quantity of fluid. This instrument is filled with spirit of wine, with the addition of as much mercury as is sufficient to fill both legs of the siphon, and about a fourth or fifth part of the ball A. The common degrees of heat are shewn by the top of the mercury in the longest leg, or by the top of the spirit, in case any of it is left above the mercury. When the mercury in the longest leg sinks by cold, that in the shorter leg will rise, and will run over into the ball A; from whence it cannot return back when the thermometer rises again, as the surface of the mercury in the ball is below the orifice of the tube *n*. Therefore the upper part of the shorter leg will be filled with a column of spirits of a length proportional to the increase of heat; the bottom of which, by means of a proper scale, will shew how much the thermometer has been lower than it is; which being subtracted from the present height, will give the lowest point that it has been at. In order to prevent the mercury from falling into the ball A in large drops, which would affect the accuracy of the instrument, the top of the shorter leg, close to the ball, is contracted, by being held in the flame of a lamp, and the passage farther straightened by a solid thread of glass placed within the tube, and extending from the bottom of the shorter leg to the part near the ball A, where it is most contracted. By this means, as soon as any small portion of mercury is got beyond the thread of glass, it breaks off, and falls into the ball in very small drops.

In order to fill the shorter leg with mercury, for a new experiment, it must be inclined till the mercury in the ball covers the orifice of the tube *n*. The cylinder being then heated, the mercury will be forced into the shorter leg, and will run down the thread of glass in drops, which will soon unite. Thus such a quantity of mercury must be got into the shorter leg, as, upon the cooling of the instrument, will be sufficient to drive all the spirit of wine into the ball, with a less degree of cold than what the thermometer is likely to be exposed to. The ball A must always have some mercury in it, but never enough to fill it up to the orifice of the tube *n*. It will be best to leave a little of the spirit above the mercury in the longest leg; in which case the top of the spirit will shew the common degrees of heat. The scale of degrees on the shorter leg will, in different seasons, be liable to an error similar to that which was explained in the first mentioned thermometer; but it will be less considerable, as the space between the two scales is filled with mercury, whose expansion is about six times less than that of the spirit of wine. In the thermometer now described, the bore of the tube is about 0.054 inches; and one inch of it contains eight grains of mercury, and answers to seven degrees of Fahrenheit's scale. The drops of mercury which fall into the ball A, answer to about one-eighth of a degree.

Instruments of this kind, with some alteration in their construction, would serve for finding the temperature of the sea at great depths, and also for finding that of the air at considerable heights. Lord Charles Cavendish has shewn how to adapt them for such purposes. See *Phil. Trans.* vol. I. art. 38. p. 300, &c.

Since the publication of Mr. Canton's discovery of the compressibility (see *COMPRESSION*) of spirits of wine and other fluids, there are two corrections necessary to be made in the result given by lord Charles Cavendish's thermometer. For in estimating, *e. g.* the temperature of the sea at any depth, the thermometer will appear to have been colder than

it really was: and besides, the expansion of spirits of wine by any given number of degrees of Fahrenheit's thermometer is greater in the higher degrees than in the lower. For the method of making these two corrections by Mr. Cavendish, see Phipps's *Voyage to the North Pole*, p. 145.

Instruments of this kind, for determining the degree of heat or cold in the absence of the observer, have been invented and described by others. Van Swinden (*Diff. sur la Comparison du Therm.* p. 253—255.) describes one, which, he says, was the first of the kind made on a plan communicated by M. Bernouilli to M. Leibnitz. M. Kraft, he also tells us, made one nearly like it. Mr. Six, in 1782, proposed another construction of a thermometer of the same kind, which has been well received.

This is properly a spirit thermometer, though mercury is employed in it for the purpose of supporting a certain index: *ab* (*fig. 14.*) is a tube of thin glass, about sixteen inches long, and  $\frac{1}{2}$ ths of an inch in diameter; *cdefgh* is a smaller tube, with the inner diameter about  $\frac{1}{4}$ th, joined to a larger at the upper end *b*, and bent down first on the left side, and then, after descending two inches below *ab*, upwards again on the right, in the several directions *cde*, *fgb*, parallel to, and one inch distant from it. At the end of the same tube at *b*, the inner diameter is enlarged to half an inch from *b* to *i*, which is two inches in length. This glass is filled with highly rectified spirit of wine to within half an inch of the end *i*, excepting that part of the small tube from *d* to *g*, which is filled with mercury. From a view of the instrument it will be readily conceived, that when the spirit in the large tube is expanded by heat, the mercury in the small tube on the left side will be pressed down, and cause that on the right side to rise: on the contrary, when the spirit is condensed by cold, the reverse will happen. Fahrenheit's scale, which begins with 0 at the top of the left side, has the degrees numbered downwards, while that at the right side, beginning with 0 at the bottom, ascends. The divisions are ascertained by placing the thermometer with a good standard mercurial one in water, gradually heating or cooling, and marking the divisions of the new scale at every five degrees. The divisions below the freezing point are taken by means of a mixture of sea-salt and ice, as described by Nollet, De Luc, and others. In order to shew how high the mercury has risen in the observer's absence, there is placed within the small tube of the thermometer, above the surface of the mercury on either side, immersed in the spirit of wine, a small index, so fitted as to pass up and down as occasion may require. One of these indices is represented in *fig. 15*; *a* is a small glass tube, three-quarters of an inch long, hermetically sealed at each end, inclosing a piece of steel wire nearly of the same length; at each end *c, d*, is fixed a short piece of a tube of black glass, of such a diameter as to pass freely up and down within the small tube of the thermometer. The lower end, floating on the surface of the mercury, is carried up with it when it rises, while the piece at the upper end, being of the same diameter, keeps the body of the index parallel to the sides of the thermometrical tube. From the upper end of the body of the index at *e* is drawn a spring of glass of the fineness of a hair, about five-fourths of an inch in length, which being set a little oblique, presses lightly against the surface of the tube, and prevents the index from following the mercury when it descends, or being moved by the spirit passing up and down, or by any sudden motion given to the instrument; but at the same time the pressure is so adjusted as to permit this index to be readily carried up by the surface of the rising mercury, and downwards, whenever the instrument is rectified for observation. This index, by not returning

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turning with the mercury when it descends, shews distinctly and accurately how high the mercury has risen, and consequently what degree of cold or heat has happened. To prevent the spirit from evaporating, the tube at the end is closely sealed. The daily rectification of this instrument is performed, by applying a small magnet to that part of the tube against which the index rests; by the action of which the included piece of steel wire, and consequently the index, is easily brought down to the surface of the mercury. When this has been done, the instrument is rectified for the next day's observation, without heating, cooling, separating, or at all disturbing the mercury, or moving the instrument. With a thermometer of this sort, Mr. Six observed the greatest heat and cold that happened every day and night throughout the year 1781. But for the more particular description of this instrument, the illustration of it by figures, and an account of its advantages, the limits of this work require our referring to Phil. Transf. vol. lxxii. part i. p. 72, &c.

A similar effect to that produced by Six's thermometer is obtained in Rutherford's arrangement of a pair of thermometers, one with mercury, the other with spirit of wine, placed in a horizontal position; one index being without the surface of the mercury, the other within that of the spirit: the thermometers being in contrary directions, both indices may be brought back to their places, by merely raising the end of the instrument. (See *fig.* 16.) Self-registering thermometers have also sometimes been constructed for keeping a still more accurate account of all the variations of temperature that have occurred, by describing a line on a revolving barrel, which shews the height for every instant during the whole time of their operation.

M. de Luc has described the best method of constructing a thermometer, fit for determining the temperature of the air, in the mensuration of heights by the barometer. He has also shewn how to divide the scale of a thermometer, so as to adapt it for astronomical purposes in the observation of refraction. See *Récherches, &c.* tom. ii. p. 35, &c. p. 265, &c.

Mr. Cavallo, in 1781, proposed the construction of a thermometrical barometer, which, by means of boiling water, might indicate the various gravity of the atmosphere, or the height of the barometer. This thermometer, he says, with its apparatus, might be packed up into a small portable box, and serve for determining the heights of mountains, &c. with greater facility than with the common portable barometer. The instrument, in its present state, consists of a cylindrical tin vessel, about two inches in diameter, and five inches high, in which vessel the water is contained, which may be made to boil by the flame of a large wax-candle. The thermometer is fastened to the tin vessel in such a manner, as that its bulb may be about one inch above the bottom. The scale of this thermometer, which is of brass, exhibits on one side of the glass tube a few degrees of Fahrenheit's scale, *viz.* from  $200^{\circ}$  to  $216^{\circ}$ . On the other side of the tube are marked the various barometrical heights, at which the boiling water shews those particular degrees of heat which are set down in sir G. Shuckburgh's table. With this instrument the barometrical height is shewn within one-tenth of an inch. The degrees of this thermometer are somewhat longer than one-ninth of an inch, and therefore may be divided into many parts, especially by a Nonius. But the greatest imperfection of the instrument arises from the smallness of the tin vessel, which does not admit a sufficient quantity of water; but when the quantity of water is sufficiently large, *e. g.* 10 or 12 ounces, and is kept boiling

in a proper vessel, its degree of heat under the same pressure of the atmosphere is very settled; whereas when a thermometer is kept in a small quantity of boiling water, the quicksilver in its stem does not stand very steady, sometimes rising or falling even half a degree. Mr. Cavallo proposes a farther improvement of this instrument in the Phil. Transf. vol. lxxi. part ii. p. 524.

The ingenious Mr. Wedgwood, so well known for his various improvements in the different sorts of pottery-ware, has contrived to make a thermometer for measuring the higher degrees of heat, by means of a distinguishing property of argillaceous bodies, *viz.* the diminution of their bulk by fire. This diminution commences in a low red heat, and proceeds regularly, as the heat increases, till the clay becomes vitrified. The total contraction of some good clays which he has examined in the strongest of his own fires, is considerably more than one-fourth part in every dimension. If, therefore, we can procure at all times a clay sufficiently apyrous or unvitrescible, and always of the same quality in regard to contraction by heat; and if we can find means of measuring this contraction with ease and accuracy, we shall be furnished with a measure of fire sufficient for every purpose of experiment or business. Some of the purest Cornish porcelain clays (which, by the analysis of Mr. Wedgwood, appear to contain no calcareous earth nor gypseous matter, but to consist of pure argillaceous or alum earth, and another indissoluble earth, which he apprehends to be of the siliceous kind, in the proportion of three parts of the former to two parts of the latter) seem the best adapted, both for supporting the intensity, and measuring the degrees of fire. This material is prepared for use by washing it over, and whilst in a diluted state passing it through a fine lawn: it is then dried and put up in boxes. The dry clay is to be softened for use with about two-fifths its weight of water; and formed into small pieces, in little moulds of metal,  $\frac{3}{4}$ ths of an inch broad, with the sides exactly parallel; about  $\frac{3}{4}$ ths of an inch deep, and an inch long. The moulds are to be oiled and warmed. These pieces, when perfectly dry, are put into another iron mould or gage, consisting only of a bottom, with two sides,  $\frac{5}{8}$ ths of an inch deep, to the dimensions of which sides the breadth of the pieces is to be pared down. For measuring the diminution which they are to suffer from the action of fire, another gage is made of two pieces of brass, twenty-four inches long, with the sides exactly straight, divided into inches and tenths, fixed five-tenths of an inch asunder at one end, and three-tenths at the other, upon a brass plate; so that one of the thermometric pieces, when pared down in the iron gage, will just fit to the wider end. If this piece be supposed to have diminished in the fire one-fifth of its bulk, it will then pass on to half the length of the gage; if diminished two-fifths, it will go on to the narrowest end: and in any intermediate degree of contraction, if the piece be slid along till it rests against the converging sides, the degree at which it stops will be the measure of its contraction, and consequently of the degree of heat it has undergone. The thermometric pieces may be formed much more expeditiously than in the single mould by means of an instrument, consisting of a cylindrical iron vessel, with holes in the bottom, of the form and dimensions required.—The soft clay, put in the vessel, is forced by a press down through these apertures, in long rods, which may be cut while moist, or broken when dry, into pieces of convenient lengths. After which, recourse should be had to the paring gage for ascertaining and adjusting their breadth when perfectly dry.

Each division of the scale, though so large as a tenth of

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an inch, answers to  $\frac{1}{10}$ th part of the breadth of the little piece of clay. When one gage is accurately adjusted to the proportional measures above stated, two pieces of brass should be made, one fitting exactly into one end, and the other into the other; which will serve as standards for the ready adjustment of other gages to the dimensions of the original, and thus we may be assured, that thermometers on this principle, though made by different persons, and in different countries, will all be equally affected by equal degrees of heat, and all speak the same language. The scale commences at a red heat fully visible in day light; and the greatest heat which Mr. Wedgwood has hitherto obtained in his experiments, is  $160^{\circ}$ . Swedish copper has been found to melt at  $27^{\circ}$ , silver at  $28^{\circ}$ , and gold at  $32^{\circ}$ , of this thermometer. Brass is in fusion at  $21^{\circ}$ : the welding heat of iron is from  $90^{\circ}$  to  $95^{\circ}$ , and the greatest heat that could be produced in a common smith's forge,  $125^{\circ}$ . Cast iron melted at  $130^{\circ}$ ; and the heat by which iron is run down among the fuel for casting is  $150^{\circ}$ . A Hessian crucible melted into a slag-like substance at about  $150^{\circ}$ . The fusing heat of glass furnaces, or that by which the perfect vitrifications of the materials is produced, was at one of them  $114^{\circ}$  for flint-glass, and  $124^{\circ}$  for plate-glass. Delft-ware is fired by a heat of  $40^{\circ}$  or  $41^{\circ}$ ; Queen's-ware by  $86^{\circ}$ ; and stone-ware by  $102^{\circ}$ , which degree of heat changes it to a true porcelain texture. The thermometer pieces begin to acquire a porcelain texture at about  $110^{\circ}$ . A piece of an Etruscan vase melted completely at  $33^{\circ}$ ; pieces of other vase and Roman ware about  $36^{\circ}$ ; Worcester china vitrified at  $94^{\circ}$ ; Mr. Sprimont's Chelsea china at  $105^{\circ}$ ; the Derby at  $112^{\circ}$ ; the Bow at  $121^{\circ}$ ; but Bristol china shewed no appearance of vitrification at  $135^{\circ}$ . The common sort of Chinese porcelain does not perfectly vitrify by any fire which Mr. Wedgwood could produce: but began to soften about  $120^{\circ}$ , and at  $156^{\circ}$  became so soft as to sink down and apply itself close upon an irregular surface underneath. The true stone Nankeen does not soften in the least, by this strong heat; nor even acquire a porcelain texture. The Dresden porcelain is more refractory than the common Chinese, but not equally so with the stone Nankeen. The cream-coloured or Queen's-ware bears the same heat as the Dresden. Mr. Pott says, that to melt a mixture of chalk and clay in certain proportions, which appear from his tables to be equal parts, is "among the master-pieces of art." This mixture melts into a perfect glass at  $123^{\circ}$  of this thermometer. For other curious particulars, see Phil. Trans. vol. lxxii. part ii. p. 305, &c.

This thermometer, says Dr. Young, (Lect. on Nat. Philos. vol. i. 648.) may be extremely useful for identifying the degree of heat which is required for a particular purpose; but for the comparison of temperatures by an extension of the numerical scale, we have not sufficient evidence of its accuracy to allow us to depend on its indications; and it is scarcely credible, that the operation of furnaces of any kind, can produce a heat of so many thousand degrees of a natural scale, as Mr. Wedgwood's experiments have led him to suppose; nor is the supposition consistent with the observations of other philosophers.

**THERMOMETER, Differential**, a curious sort of thermometer invented by professor Leslie, which expresses not the absolute degree of heat, but the difference, when any exists, between the temperatures of the two spots where its two bulbs are placed. The method of constructing it is as follows. (See Plate XVI. *Pneumatics*, fig. 17.) Select two thermometer tubes with bores rather wider than usual, and one a little wider than the other. Let the balls be blown

as equal as the eye can judge, and from .4 to .7 of an inch in diameter, and let the open end of the tube also be widened in a slight degree. The tubes must be of unequal length, the longest being nearly twice the length of the other. Then introduce into the longer tube a little sulphuric acid tinged with carmine, sufficient to fill about an inch of its cavity; join the two tubes together by the blow-pipe, and when joined, bend them in the form of the letter U, with the bulbs about three or four inches asunder, making one flexure just below the juncture of the two tubes, where the small cavity (which is represented in the plate) facilitates the adjustment of the instrument, which by a little dexterity is performed by forcing a few globules of air by the heat of the hand from one bulb to the other. Attach a graduated scale to the shorter tube, making the zero about the middle of it, and adjust to it the quantity of air in each bulb, so that when the bulbs are at the same temperature, the upper surface of the coloured liquor may just correspond with the zero. Sulphuric acid is chosen as the liquor interposed between the bulb, on account of its bearing any heat or cold that would be used without being evaporated or congealed.

In this instrument the air inclosed in the bulbs is the substance, which, by its expansion or contraction, causes the motion of the coloured liquor up or down the scale, and as gases are much more expansible than liquids, the instrument is sooner affected by minute changes of heat. But as the two bulbs are of equal size, and both filled with air, and separated from each other by the intervening liquor, it is obvious that when the temperature is the same in each bulb, be it high or low, the pressure on each side of the liquor is also equal, and it must remain stationary: so that it can only move when one bulb is warmer than the other. Hence the particular and sole use of this instrument as a differential thermometer. The lower part of the instrument (or the space included between the two bends) is cemented to an upright stem, by which it is supported.

This instrument has been employed by the inventor in a variety of curious experiments on caloric, or the matter of heat. The peculiar advantage which this instrument possesses is, that, besides its extreme sensibility, in using it the common temperature of the surrounding air may, in general, be disregarded; this being always the zero of the scale, whatever be the actual variation of heat in the surrounding atmosphere; and hence a much greater degree of simplicity is introduced into the delicate researches on this subject. For the reflection of heat mirrors were employed, generally of block-tin, highly polished, and hammered to fit a wooden gage, the segment of a parabolic curve, by which much of the dispersion produced by a simple concave form was avoided; so that when exposed to the direct rays of the sun, they collected them into a pretty distinct focus, of about half an inch in diameter. The substance employed to generate the radiant heat was a hollow cubic tin canister, placed directly in front of the mirror of its focal point, and when used, filled with boiling water, and fitted with a common thermometer, passing through a hole in the cover, and immersed in the water. The cubical form of the canister allowed of four sides, of perfectly equal dimensions, each of which, when turned to the mirror, afforded a heated surface for the transmission of radiant caloric, and they were occasionally coated with various substances to ascertain the effect of colour, polish, and the like, in retarding or promoting the radiation of the heat within. With this apparatus, and his differential thermometer, Mr. Leslie performed a variety of interesting experiments,  
for





TABLE for the Centigrade Thermometer.

Cent.	Reau.	Fahr.									
100	80.	212.	64	51.2	147.2	29	23.2	84.2	6	4.8	21.2
99	79.2	210.2	63	50.4	145.4	28	22.4	82.4	7	5.6	19.4
98	78.4	208.4	62	49.6	143.6	27	21.6	80.6	8	6.4	17.6
97	77.6	206.6	61	48.8	141.8	26	20.8	78.8	9	7.2	15.8
96	76.8	204.8	60	48.	140.	25	20.	77.	10	8.	14.
95	76.	203.	59	47.2	138.2	24	19.2	75.2	11	8.8	12.2
94	75.2	201.2	58	46.4	136.4	23	18.4	73.4	12	9.6	10.4
93	74.4	199.4	57	45.6	134.6	22	17.6	71.6	13	10.4	8.6
92	73.6	197.6	56	44.8	132.8	21	16.8	69.8	14	11.2	6.8
91	72.8	195.8	55	44.	131.	20	16.	68.	15	12.	5.
90	72.	194.	54	43.2	129.2	19	15.2	66.2	16	12.8	3.2
89	71.2	192.2	53	42.4	127.4	18	14.4	64.4	17	13.6	1.4
88	70.4	190.4	52	41.6	125.6	17	13.6	62.6	18	14.4	— 0.4
87	69.6	188.6	51	40.8	123.8	16	12.8	60.8	19	15.2	2.8
86	68.8	186.8	50	40.	122.	15	12.	59.	20	16.	4.
85	68.	185.	49	39.2	120.2	14	11.2	57.2	21	16.8	5.8
84	67.2	183.2	48	38.4	118.4	13	10.4	55.4	22	17.6	7.6
83	66.4	181.4	47	37.6	116.6	12	9.6	53.6	23	18.4	9.4
82	65.6	179.6	46	36.8	114.8	11	8.8	51.8	24	19.2	11.2
81	64.8	177.8	45	36.	113.	10	8.	50.	25	20.	13.
80	64.	176.	44	35.2	111.2	9	7.2	48.2	26	20.8	14.8
79	63.2	174.2	43	34.4	109.4	8	6.4	46.4	27	21.6	16.6
78	62.4	172.4	42	33.6	107.6	7	5.6	44.6	28	22.4	18.4
77	61.6	170.6	41	32.8	105.8	6	4.8	42.8	29	23.2	20.2
76	60.8	168.8	40	32.	104.	5	4.	41.	30	24.	22.
75	60.	167.	39	31.2	102.2	4	3.2	39.2	31	24.8	23.8
74	59.2	165.2	38	30.4	100.4	3	2.4	37.4	32	25.6	25.6
73	58.4	163.4	37	29.6	98.6	2	1.6	35.6	33	26.4	27.4
72	57.6	161.6	36	28.8	96.8	1	0.8	33.8	34	27.2	29.2
71	56.8	159.8	35	28.	95.	0	0.	32.	35	28.	31.
70	56.	158.	34	27.2	93.2	1	0.8	30.2	36	28.8	32.8
69	55.2	156.2	33	26.4	91.4	2	1.6	28.4	37	29.6	34.6
68	54.4	154.4	32	25.6	89.6	3	2.4	26.6	38	30.4	36.4
67	53.6	152.6	31	24.8	87.8	4	3.2	24.8	39	31.2	38.2
66	52.8	150.8	30	24.	86.	5	4.	23.	40	32.	40.
65	52.	149.									

**THERMOPOLIUM**, formed of  $\theta\epsilon\rho\mu\omicron\varsigma$ , *hot*, and  $\pi\omega\lambda\iota\varsigma$ , *I sell*, a name for a sort of public houses among the ancients, in which hot liquors were sold, in the manner of our coffee-houses.

**THERMOPSIS**, in *Botany*, from  $\theta\epsilon\rho\mu\omicron\varsigma$ , *a Lupine*, and  $\omega\lambda\iota\varsigma$ , *appearance or aspect*, indicating a general resemblance to that genus of plants.—Brown in Ait. Hort. Kew. v. 3. 3.—Class and order, *Decandria Monogynia*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Ess. Ch. Calyx oblong, five-cleft half way down, two-lipped; convex behind; tapering at the base. Corolla papilionaceous; petals nearly of equal length; standard reflexed at the sides, keel obtuse. Stamens permanent. Legume compressed, linear, with many seeds. *Br.*

1. *Th. lanceolata*. Sharp-leaved Thermopsis. Ait. n. 1. (*Podalyria lupinoides*; Willd. Sp. Pl. v. 2. 504. *Sophora lupinoides*; Linn. Sp. Pl. 534. "Pallas Astrag. 119. t. 89.")—Leaflets oblong-lanceolate. Stipulas lanceolate, twice as long as the footstalks. Flowers whorled.—Native of Siberia; from whence the late duke of Northumberland is said to have received it in 1776. This is a hardy perennial herbaceous plant, flowering in June and July. The stems are spreading or decumbent, about a foot long, branched in an alternate manner, round, hairy, leafy. Leaves ternate, light green, hairy, on short stalks; their leaflets about an

inch long. Stipulas half as large, or more. Flowers stalked, about three in each whorl, yellow, much resembling those of a Lupine. Calyx hairy.

By Mr. Brown's specific character, we presume there are more species of this genus, though not in our gardens, of which he will one day give an account. For the soundness of the generic distinctions, we rely on him. The compressed legume seems the most important difference between *Thermopsis* and the *Baptista* of Ventenat and Brown; see Ait. Hort. Kew. v. 3. 5; also our articles *SOPHORA* and *PODALYRIA*.

**THERMOPYLÆ**, in *Ancient Geography*, a strait or pass, rendered famous by the valour of Leonidas and his companions, who defended it against the army of Xerxes in the year 480 B.C; and which, long after that celebrated event, was defended against the Gauls. This pass is the only road by which an army can penetrate from Thessaly into Locris, Phocis, Bœotia, Attica, and the adjacent countries. The following succinct description is given of this strait by the abbé Barthelemy, in his "Anacharxis." On quitting Phocis to go into Thessaly, having passed the little country of the Locrians, we arrive, says the abbé, at the town of Alpenus, situated by the sea. As it stands at the entrance of the strait, it has been fortified. The road at first is only wide enough for the passage of a waggon; but

it afterwards enlarges itself between morasses formed by the waters of the sea and almost inaccessible rocks, which terminate the chain of mountains known by the name of Oeta. After leaving Alpenus, a stone is discovered on the left, consecrated to Hercules Melanopygus, and a path presents itself that leads to the summit of the mountain. Farther on, the traveller crosses a current of hot water, which gives this place its name of Thermopylæ. Next to this stream is the town of Anthela; and in the plain which surrounds it are a small eminence and a temple of Ceres, in which the Amphictyons annually held one of their assemblies. On coming out of the plain there is a road, or rather causeway, only about seven or eight feet wide. Here the Phocians had formerly built a wall, to protect their country from the inroads of the Thessalians. After passing the Phœnix, which at last falls into the Afopus, a river that rises in an adjacent valley, we come to the last defile, half a plethrum (15 or 16 yards) in breadth. The road then widens as far as Trachinia, which takes its name from the city of Trachis, that was inhabited by the Malians. This country presents to the view of the traveller extensive plains watered by the Sperchius and other rivers. To the E. of Trachis stood the city of Heraclea, which did not exist in the time of Xerxes. The whole strait, from the defile before we arrive at Alpenus to that which is beyond the Phœnix, may be about 48 stadia (about 2 leagues) in length. Its breadth varies almost at every step; but through its whole extent it is shut in on one side by steep mountains, and on the other by the sea, or impenetrable morasses. The road is often destroyed by the torrents, or by stagnant waters. Leonidas posted his little army near Anthela, rebuilt the wall of the Phocians, and dispatched a few advanced troops to defend the approaches. But it was not sufficient to guard the passage at the foot of the mountain; on the mountain itself there was a path, which, beginning at the plain of Trachis, terminated, after various windings, near the town of Alpenus. Leonidas entrusted the defence of this path to the thousand Phocians he had with him, and who took post on the heights of mount Oeta. As soon as these arrangements were completed, the army of Xerxes was discovered, spreading itself over Trachinia, and covering the plain with its innumerable tents. The Greeks deliberated on the measures proper to be adopted; most of the generals were for retiring to the isthmus; but Leonidas rejected this counsel. A Persian horseman was deputed to reconnoitre the advanced post of the Greeks, which was composed of Spartans; and as the rest of the army was concealed from him by the wall, he only gave an account to Xerxes of the 300 men he had seen at the entrance of the defile. After various messages from Xerxes to Leonidas, and the firm and calm replies of the latter, the Persian king was enraged, and gave orders for an attack. The Medes rushed on with fury, and one rank fell after another, while the Greeks, pressing close against each other, and covered with large bucklers, presented an impenetrable front of long pikes, and a phalanx which fresh troops successively in vain attempted to break. At length the Medes were seized with a panic, and fled; but they were speedily relieved by the chosen body of the 10,000 immortals, commanded by Hydarnes. The action now became more bloody; but the Greeks had the advantage of situation, and superiority of arms. The Persians lost many men; and Xerxes, witnessing their flight, leaped, as it is said, more than once from his chariot, and trembled for their fate. Next day the attack was renewed, but with so little success, that Xerxes despaired of forcing the passage. At length Epialtes, an inhabitant of those districts, discovered to him the fatal path by which he might turn the Grecians; and served as a guide

to Hydarnes and his corps of immortals, under whose conduct they arrived near the spot where Leonidas had posted a detachment of his army; and prepared to attack it. When this dreadful news reached the Greeks, their leaders assembled. Some were for retreating, and others for remaining; but Leonidas declared for himself and his companions, that they were not permitted to quit a post which Sparta had confided to their care. In the middle of the night, the Greeks, with Leonidas at their head, issued out of the defile, advanced through the plain, overthrew the advanced posts, and penetrated to the tent of Xerxes, who had already taken flight. They spread over the camp, and glutted themselves with carnage. The Persians were terrified and confused, and many of them perished by the hands of one another. At length, with the dawn of day they discovered the inconsiderable number of their victors, and rallying, attacked the Greeks on all sides. Leonidas fell beneath a shower of darts; and a contest for the honour of carrying off his body, occasioned a terrible conflict between his companions and the most expert and hardy warriors of the Persian army. The Greeks, however, prevailed, and carried off their general; and having regained the defile, posted themselves on an eminence, and for some time continued to defend themselves. When Xerxes offered to Leonidas the empire of Greece, if he submitted to his power, he replied, "I rather choose to die free than to enslave my country." When the king commanded him to surrender his arms, he wrote the laconic answer, "come and take them." "The Persians are near us," said one of his soldiers to Leonidas: "rather say," he coolly replied, "that we are near the Persians." See LEONIDAS.

It has been a subject of dispute what was the number of Grecian troops under the command of Leonidas at Thermopylæ. Herodotus states them at 5100, Pausanias at 11,200, and Diodorus at 7400. The abbé Barthelemy attempts to reconcile these different statements, and concludes, upon the whole, that Leonidas had with him about 7000 men. If we may credit Diodorus, he had no more than 500 soldiers when he determined to attack the Persian camp.

On the eminence to which the companions of Leonidas retired after the death of their commander, there were several monuments erected by order of the Amphictyonic council, in honour of the 300 Spartans, and the other Grecian troops engaged in the combat. On one of these cippi is inscribed, "Here four thousand Greeks of Peloponnesus fought against three millions of Persians."

**THERMOSCOPE**, an instrument shewing the changes happening in the air with respect to heat and cold.

The word thermoscope is generally used indifferently with that of thermometer. There is some difference, however, in the literal import of the two; the first signifying an instrument that shews or exhibits the changes of heat, &c. to the eye; formed from θερμη, heat, and σκοπω, video, I see; and the latter an instrument that measures those changes, from θερμη, heat, and μετρον, to measure, on which foundation the thermometer should be a more accurate thermoscope, &c. This difference the excellent Wölfius taking hold of, describes all the thermometers in use as thermoscopes; shewing that none of them properly measure the changes of heat, &c. none of them do more than indicate the same. Though their different heights yesterday and to-day shew a difference of heat; yet, since they do not discover the ratio of yesterday's heat to to-day's, they are not strictly thermometers.

**THERONDELS**, in Geography, a town of France, in the department of the Avairon; 3 miles N.E. of Mur.

**THEROUANNE**, a town of France, in the department of the Straits of Calais, on the Lys. It was anciently the

the capital of the Morini, and afterwards an episcopal see, with several churches and convents; but being taken in the year 1553 by the emperor Charles V., he demolished it. The district belonging to it, however, was ceded by Spain to France, at the treaties of the years 1559 and 1659; 6 miles S. of St. Omer.

**THERSA**, or **THAPSA**, in *Ancient Geography*, a royal town of Judea, in the half-tribe of Manasseh, on this side of Jordan. Therfa was the seat, capital, and burying-place of the first kings of Israel.

**THERSA**, or *Thirza*, a town of Palestine, in the tribe of Ephraim.

**THERSARA**, a town of Asia, in the interior of Assyria. Ptolemy.

**THERSITÆ**, a people of Spain, in Iberia; they were of the number of those whom Annibal caused to pass into Africa.

**THERUINGI**, a people who inhabited a part of Dacia, on the other side of the Danube.

**THESBON**, a town of Palestine, on the other side of Jordan, in the tribe of Gad.

**THESEA**, or **THESEA**, *Θησεα*, in *Antiquity*, feasts celebrated by the Athenians in honour of Theseus.

In spite of the important services that hero had done his country, in delivering it from a shameful tribute of so many youths, of either sex, sent yearly to be devoured by the Minotaur in Crete (as the fable has it), or sent as slaves to Minos, king of Crete, as the histories have it, from which he freed them, by overturning Taurus, Minos's general; he was banished for some time, and retired to Scyros, under the protection of Lycomedes, king of that island, where he finally lost his life either by accident, or in consequence of the jealousy of the king.

The gods, it is said, revenged this treatment Theseus received from the Athenians, by afflicting them with a famine, which the oracle assured them should not cease till they had avenged his death. Upon this they slew Lycomedes, brought Theseus's bones to Athens, placed them in a temple erected to him, and appointed Thesea to be held every eighth day of each month, in which largesses were distributed to the people, and the day was spent, by the rich, in feasting and rejoicing, and with peculiar solemnity on the eighth day of the month Pyanepsion.

Plutarch, however, gives a different account of the origin of this feast; he says that the Athenians, imagining they saw Theseus at the battle of Marathon under the form of a tutelary deity, consulted the oracle on this prodigy: and being ordered to collect his bones in the island of Scyros, removed them with great pomp to Athens; and deposited them under a magnificent monument erected in the middle of the city, which became afterwards an asylum for slaves, in commemoration of the success afforded by this prince to the unfortunate during his life. They also erected a temple where they offered sacrifices, &c. At Rome, Theseus was held in very different estimation, for Virgil (*Æn. lib. vi.*) places him in Tartarus, among those who were tormented for their crimes.

**THESEUS**, in *Biography*, a hero celebrated in the fabulous ages of Greece, and referred by chronologers to the thirteenth century B.C. was the illegitimate son of Ægeus, king of Athens, by Æthra, daughter of Pittheus, king of Troezen; and as he advanced towards maturity discovered a vigorous spirit in an athletic frame. In his journey to Athens by land he met with many adventures and conflicts, and on his arrival found the city agitated by dissensions. The sons of Pallas, the brother of Ægeus, suspecting that the aged and childless sovereign would adopt this newly arrived stranger for his heir, fomented his jealousies, so that

Ægeus prepared poison for dispatching him; but before his plan could be accomplished, he discovered by certain tokens that he was his son. The consequence of this discovery was a revolt of the Pallantides, which Theseus suppressed.

For an account of the further exploits of Theseus for the relief of the Athenians, we refer to our article *History of Athens*. Theseus having, in the manner there related, established a constitution for the Athenians, yielded to the impulse of ambition; and quitting his throne, and sometimes in the company of Hercules and sometimes of Pirithous, son of Ixion, king of Thessaly, whose friendship he had secured, undertook a variety of enterprizes, the account of which is so intermixed with the fabulous, that it is impossible satisfactorily to develop it. He is said, however, to have conquered certain Amazons on the banks of the Thermodon, in Asia, taking a queen from among them for his wife; to have assisted Pirithous in overcoming the Centaurs in Thessaly; and to have stolen away from Sparta the celebrated Helen; and afterwards to have joined the same friend in a similar attempt upon Proserpina, the daughter of Aidoneus, king of the Molossians, in which Pirithous lost his life, and Theseus underwent an imprisonment, from which Hercules procured his escape. Upon his return from this romantic expedition, he found his kingdom and family in confusion. Castor and Pollux, the brothers of Helen, ravaged Attica by way of revenge for the insult offered to their sister. His queen Phædra, falling in love with Hippolytus, his son by the Amazon, and being rejected, calumniated him to his father, and occasioned his death, as his tragedy has recorded. From a variety of circumstances that occurred, Theseus finding that he had lost the attachment of the Athenians, abandoned the city, and intended to repair to Demetrius, son of Minos, now reigning in Crete. In his passage thither he was driven by a storm to the isle of Scyros, where he was kindly received by the king, Lycomedes; but soon afterwards he lost his life by a fall from a rock. (See **THESEA**.) The resentment of the Athenians afterwards subsided, and they regarded him only as a hero and benefactor; and Cimon, son of Miltiades, having conveyed his bones, as they were supposed to be, to Athens, in consequence of the injunctions of an oracle, a magnificent temple was erected over them, which was made an asylum for the unfortunate. Its remains still subsist as one of the noblest relics of ancient art in that famous capital. Plut. in Vit. Thesei. Anc. Univ. Hist. Travels of Anacharsis, vol. i.

**THESIN**.—*Per Arsin and Thesin*. See **PER ARSIN**.

**THESIS**, *θεσις*, position, formed from *τιθημι*, I put or lay down, in the *Schools*, a general proposition, which a person advances, and offers to maintain.

In the college it is frequent to have placards, containing a number of these theses in theology, in medicine, in philosophy, in law, &c. The maintaining a thesis, is a great part of the exercise a student is to undergo for a degree.

**THESIS**, in *Logic*, &c.—Every proposition may be divided into thesis and hypothesis; thesis contains the thing affirmed or denied, and hypothesis the conditions of the affirmation or negation.

Thus, in Euclid, if a triangle and parallelogram have equal bases and altitudes (is the hypothesis), the first is half of the second (the thesis).

*Arfis and Thesifis*. See **ARSIS**.

**THESIS**, *θεσις*, depositio or remissio, the beating down the hand or foot at the beginning of a bar in music. See **ARSIS**, *tollo*, which is the lifting up the hand or foot in the middle or latter part of a bar.

**THESIUM**, in *Botany*, an ancient name, adopted from the Greeks, enumerated by Linnæus, Phil. Bot. 174, among

those whose derivation is extremely difficult, and, after all, doubtful. Pliny has the *Thesium* in two places; book 21. chap. 17, and book 22. chap. 22. In the former, it is mentioned amongst bulbous plants, as having a harsh taste: in the latter, it stands next to *Pteris*, as very bitter, and purgative. This last account is copied from Theophrastus, who, in his book 7. chap. 11, speaks of *θρῆσιον* in the same terms, along with a number of plants of the Sow-thistle and Dandelion tribe, or *Cichoraceae*. To these indeed some of the *Arum* family are subjoined, and *Thesium* is placed at the end. All we can hence gather is, that the plant in question may possibly be some plant of the *Syngenesia Polygamia-aqualis*, of the section *semiflosculose*, whose root is tuberous. Of this description there are several natives of Greece; see SCORZONERA, n. 12 and 13. Ambrosini derives the word from *θηρ*, a servant, or rather a poor tradesman, because, as he thinks, of its being serviceable in many respects, both for food and medicine. Possibly Linnæus, who frequently consulted this author, may hence have been led to apply the name of *Thesium* to the present genus, totally different indeed from all that is recorded of the Greek *θρῆσιον*, but remarkable for its mean habit and hardy texture.—Linn. Gen. 114. Schreb. 160. Willd. Sp. Pl. v. 1. 1211. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 269. Prodr. Fl. Græc. Sibth. v. 1. 164. Ait. Hort. Kew. v. 2. 63. Pursh 177. Brown Prodr. Nov. Holl. v. 1. 352. Juss. 75. Lamarek Illustr. t. 142. Gærtn. t. 86.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Veprecule*, Linn. *Eleagni*, Juss. *Santalaceae*, Brown.

Gen. Ch. *Cal.* Perianth superior, of one leaf, tubular, in four or five erect segments, internally coloured and hairy, permanent. *Cor.* none. *Stam.* Filaments equal in number to the segments of the calyx, but not so long, inserted into their base, awl-shaped; anthers roundish, of two lobes. *Pist.* Germen inferior, roundish, confluent with the base of the calyx; style thread-shaped, the length of the stamens; stigma tumid, cloven. *Peric.* none. *Seed.* Nut oval, angular, coated, crowned with the permanent involute calyx, of one cell, with a solitary kernel.

Eff. Ch. Calyx superior, of one leaf, bearing the stamens. Corolla none. Nut solitary, coated, crowned with the calyx.

Obs. Our learned friend Mr. Brown proposes to separate the Cape species of this genus from the rest, perhaps even into two distinct genera; but as we cannot find sufficient grounds for this measure, we shall admit the whole here, at least till we can obtain fuller information. *Th. Colpoon*, Linn. Suppl. 161. Willd. n. 18, is of course excluded, having a *Drupa*, and a very different habit. This is described, by some one of our coadjutors, under the article *FUSANUS*. See also *LEPTOMERIA*.—We are enabled to add a few in its stead to Willdenow's list, but cannot adopt such as are merely named by Mr. Brown, unless where we happen to have specimens.

The whole genus is of a rigid broom-like habit; sometimes roughish, though scarcely pubescent; with simple, usually very narrow, scattered leaves; and inconspicuous green, whitish, or yellowish flowers, either clustered, spiked, or somewhat capitate.

1. *Th. linophyllum*. Bastard Toad-flax *Thesium*. Linn. Sp. Pl. 301. Willd. n. 1. Fl. Brit. n. 1. Prodr. Fl. Græc. n. 1. Engl. Bot. t. 247. Pollich Palat. v. 1. 238. Roth. in Sims and König's Ann. of Bot. v. 2. 18. (*Th. pratense*; Ehrh. Herb. n. 12. *Th. montanum*; *ibid.* n. 2. *Th. intermedium*; Schrad. Spicil. 27. *Anonymos limi folio*; Clus. Hist. v. 1. 323. *Linaria adulterina*; Ger. Em. 555.)—Stem erect, somewhat branched. Cluster

mostly compound. Bractæas ternate. Leaves linear-lanceolate. Tube of the calyx cup-shaped, very short.—Native of dry chalky hills throughout most parts of Europe, though reckoned amongst our rarer English plants, flowering in July. The root is woody, perennial, branched, crooked, whitish, sending up several erect or reclining, smooth, leafy, more or less angular, rigid, branched stems, from four to twelve inches high. Leaves numerous, alternate, linear, entire, in some degree succulent and glaucous, minutely rough at the edges, as are sometimes the angles of the stem. Clusters, rather than spikes, more or less branched, or even panicled, each branch bearing one or more flowers, either solitary at the extremity, accompanied by three lanceolate, leafy, unequal bractæas, or without bractæas, in the fork of the stalk, whose divisions bear other flowers, with one or more bractæas. The latter is the more luxuriant state of this plant, in which it has been called *intermedium* by Schrader, and *montanum* by Ehrhart; we cannot see, by original specimens, that these two supposed species differ at all, not even so as to merit Willdenow's distinction of them as varieties. Our English plant is less luxuriant, answering to Pollich's excellent description. The calyx is turbinate, having hardly any tube: its limb five-cleft, whitish, spreading, acutely five-cleft, sometimes with intermediate teeth; closely involute after flowering. Anthers yellow. Stigma white, of two knobs. Fruit hard, striated, with five angles. The herb is scarcely bitter, a little saltish. It usually grows among grass, which it so much resembles at a little distance, as not to be readily discernible. The pure air of the open hills about Bury, and similar situations, seems to suit this plant, though the soil does not much promote its luxuriance of growth.

2. *Th. ramosum*. Branched German *Thesium*. "Hayne in Schrad. Journ. v. 1. 30. t. 7." Roth in Sims and König. Ann. of Bot. v. 2. 18. Marsch. von Bieberst. Caucas. v. 1. 175. (*T. alpinum*; Pollich Palat. v. 1. 239.)—Stem erect, branched. Cluster elongated. Bractæas ternate. Leaves linear-lanceolate. Flowers three or four-cleft, with a very short, cup-shaped tube.—Native of heaths, and sandy pastures or woods, in the Palatinate, flowering at the same time as the preceding. Not having been able to ascertain this species amongst our specimens, we shall copy Pollich's description, having endeavoured to improve our specific character by the assistance of that faithful and instructive writer. "The root," says he, "is white, fibrous. Stem erect, from three inches to a foot high, round, striated, smooth, branched from the very base; the branches alternate, very short. Leaves alternate or scattered, linear-lanceolate, sharpish, entire, rather fleshy; convex on one side, flat on the other; sessile, above an inch long, three-quarters of a line wide. Flowers solitary and sessile at the ends of the very short branches, between three leaves, of which the two lateral ones are smaller than the third. There is a white roundish basis, or receptacle, on which each flower stands. The calyx is two lines in diameter, green without, white within, having but three or four segments, which spread crosswise. Anthers pale yellow. Stigma white, capitate. Evidently different from the foregoing." Pollich. He mistakes however in his reference to Linnæus, Gerard, and Haller. As to Jacquin's *Enumeratio*, 40 and 213, we have no positive means of determining, the tube of the calyx not being there described. Marschall von Bieberstein considers our English plant, above described, as belonging to this species, and not to *linophyllum*.

3. *Th. alpinum*. Alpine Tubular *Thesium*. Linn. Sp. Pl. 301. Willd. n. 2. Roth in Sims and König. Ann. of Bot. v. 2. 18. (*Th. floribus subsessilibus, pedunculis foliosis, foliis linearibus*; Gerard Gallopr. 442. t. 17. f. 1. *Th.*

## THESIUM.

5. 1574; Hall. Hist. v. 2. 265.)—Stems procumbent, unbranched. Clusters simple. Bractæas ternate; the odd one very long. Leaves linear. Flowers three or four-cleft; their tube prismatic, as long as the limb.—Native of the mountains of Germany, Siberia, Switzerland, and Italy. We received it from Switzerland, and have gathered the same on mount Cenis. Haller doubted whether his plant were really distinct from *Th. linophyllum*, not adverting to the oblong angular tube of the calyx, which indeed we have not found noticed by any author, except Vahl, nor is it sufficiently indicated in Gerard's plate. That character however clearly distinguishes the *alpinum*, which may also be recognized by its numerous, short, simple, mostly procumbent stems; narrower leaves; very unequal bractæas, the middle one being from three to five times the length of the others, and greatly exceeding the flower with its stalk. The fruit is exactly oval, copiously marked with branching ribs, but not furnished with angles. The flowers, usually four-cleft, are said by Haller to have sometimes but three segments.

4. *Th. cbræatum*. Naked-flowered Thesium. "Hayne in Schrad. Journ. v. 1. 33. t. 7. Termin. Bot. n. 6. t. 26. f. 4." Roth in Sims and Kon. Ann. of Bot. v. 2. 18.)—Stem erect, unbranched. Cluster simple. Flowers without lateral bractæas; their tube cup-shaped, very short.—Found near Berlin, by Mr. Hayne, author of an elegant German and Latin work on botanical terminology. We have an authentic specimen from professor Schrader, though we accidentally are deficient in that fasciculus of his Journal, which contains the description of the present species. No dispute can arise as to its difference from all the foregoing. The wide shallow form of the calyx is like the two first, but the narrow foliage, and the long narrow terminal bractæas, agree with *Th. alpinum*. The total absence of the pair of smaller lateral bractæas, essentially distinguishes it from all three.

5. *Th. humile*. Dwarf Thesium. Vail Symb. v. 3. 43. Willd. n. 3. (*Alchimilla linearis* folio, floribus et vasculis in foliorum alis sessilibus; Shaw Afric. n. 14.)—Stem erect, branched. Flowers axillary, sessile, five-cleft; their tube very short. Gathered in cultivated ground near Tunis, by Vahl, who refers hither the synonym of Shaw, applied by Linnæus, not without scruple, to his *alpinum*; from which therefore it must of course be erased. The present is said to be annual, with an herbaceous stem hardly three inches high, branched from the base; branches smooth, angular, somewhat divided, as tall as the main stem. Leaves linear, thick, numerous, acute, an inch and half long. Tube of the calyx scarcely any; not elongated as in *Th. alpinum*. Fruit globose, rugose, the size of Coriander-seed. Vahl.

6. *Th. australe*. Australian Thesium. Br. n. 1.—"Cluster simple, elongated, somewhat spiked. Partial-stalks shorter than the flower. Calyx four or five-cleft; its segments bordered longitudinally, rather longer than the tube."—Gathered by Mr. Brown, at Port Jackson, as well as in Van Diemen's island, and on the south coast of New Holland. We have seen no specimens.

7. *Th. lineatum*. Lineated Thesium. Linn. Suppl. 162. Thunb. Prodr. 45. Willd. n. 4.—"Leaves linear. Stem round, somewhat angular; leafless in the lower part; branches straight, divaricated. Flowers axillary, stalked." Linn.—Gathered at the Cape of Good Hope, by Thunberg, who, in his *Prodromus*, defines it, "leaves lanceolate, remote; branches striated, erect." We have not seen the plant, nor does Mr. Brown mention its name.

8. *Th. squarresum*. Recurve-leaved Thesium. Linn. Suppl. 162. Thunb. Prodr. 46. Willd. n. 5.—Leaves

linear-awlshaped, recurved. Stem round. Flowers axillary, sessile.—From the same country. Thunberg says the flowers are stalked. The younger Linnæus remarks that the recurved, or reflexed, foliage gives this plant a very squarrose aspect. It does not appear that he possessed any specimen.

9. *Th. Frisæa*. Little Trailing Thesium. Linn. Mant. 213. Willd. n. 6. Thunb. Prodr. 46.—Stem decumbent. Leaves awl-shaped. Flowers spiked; densely woolly within. Fruit globose, wrinkled.—Found at the Cape of Good Hope by Koenig, who sent specimens to his preceptor Linnæus, under the new generic name of *Frisæa*, by which, we presume, he meant to commemorate his own countryman Christian Friis Rottböll; but Linnæus reduced the plant to *Thesium*. It is one of those species whose calyx is densely lined with reflexed pubescence, and of which Mr. Brown has, justifiably perhaps, made a distinct genus, on that account. Yet it has all the habit of an European *Thesium*. The little woody knobbed root sends forth numerous decumbent, simple, leafy, roundish, smooth stems, two or three inches in length. Leaves not an inch long, linear, acutely pointed; channelled above. Flowers sessile, each accompanied by two small acute bractæas. Calyx in five deep, lanceolate, acute segments, with scarcely any tube; their dense internal white woolliness did not escape Linnæus. Fruit nearly globose, much wrinkled, not so large as Coriander-seed.

10. *Th. funale*. Stringy Thesium. Linn. Sp. Pl. 302. Willd. n. 7. Thunb. Prodr. 45.—Stem with numerous long, nearly naked, branches. Leaves, and lateral bractæas, awl-shaped, very short. Flowers spiked; their segments lanceolate, densely woolly within.—Native of the Cape. The shrubby round smooth stem, with its numerous crowded upright branches, has a very rusty aspect. The little leaves are distantly scattered. The spikes are terminal, solitary, scarcely an inch long, composed of several small, crowded, not quite sessile, flowers, in structure like the last; each accompanied by one ovate, pointed, keeled bractæa, and a pair of minute, lateral, awl-shaped ones.

11. *Th. spicatum*. Large-spiked Thesium. Linn. Mant. 214. Willd. n. 8.—Stem erect, repeatedly branched. Leaves awl-shaped, minute, scattered. Flowers spiked; their segments linear, densely woolly within. Lateral bractæas lanceolate.—From the same country, growing on hills. Allied to the last, but thrice as large in almost every part, with a stout, round, straight, determinately branched stem. The leaves however are even more minute than in that species. The spikes are thick, of numerous, very densely crowded, flowers, which Linnæus defines leaves, smooth, apparently in contradistinction to those of *Th. funale*; but however smooth, or even, like that, externally, their segments, which are linear, narrow, and parallel, are full as hairy or woolly within. The outer bractæas are much dilated and rounded in their lower half; the lateral ones also are broadly lanceolate, very different from those of *funale*.

12. *Th. capitatum*. Capitate Thesium. Linn. Sp. Pl. 302. Willd. n. 9. Thunb. Prodr. 46.—Flowers capitate, sessile, terminal. Leaves three-edged, pointed, smooth. Bractæas ovate. Segments of the calyx strongly pointed; densely woolly within.—Native of the same country. The stem is hard and shrubby, with alternate distant branches; the upper ones gradually longer. Leaves alternate, small, awl-shaped, pointed. Heads of flowers terminal, a fresh branch shooting out from beneath each. Segments of the calyx very much pointed, and internally villous throughout their whole length. Linnæus. In his herbarium are specimens which answer to this description, though left by him with-

out

## THESIUM.

out any specific name, he having originally described the present species in Van Royen's *Prodromus*. The younger Linnæus took these specimens for *scabrum*, with which they agree only so far as to confirm their being the *capitatum*, contrasted therewith in Sp. Pl. Their *leaves* however can hardly be termed small, measuring near an inch in length. The *bractæas* have dilated membranous edges; fringed, as Thunberg describes them. *Calyx* with an oblong, five-angled tube. We cannot so blindly follow Willdenow, as to insert any species between this and *scabrum*.

13. *Th. scabrum*. Rough Thesium. Linn. Sp. Pl. 302. Willd. n. 13. Thunb. Prodr. 45.—Heads of flowers stalked. Leaves three-edged, pointed; their edges very rough with cartilaginous teeth.—Native likewise of the Cape. Nearly allied to the last, though undoubtedly a very distinct species. The *leaves* are but half as large, and remarkable for the cartilaginous teeth of their three edges. *Flower-stalks* sometimes two or three inches long, naked. *Calyx* with hardly any tube; its segments, according to Linnæus, internally villous at the tips only, but of this we are not perfectly convinced.

14. *Th. striatum*. Wand-like Thesium. Berg. Cap. 73. Linn. Mant. 214. Willd. n. 10. Thunb. Prodr. 45.—Leaves lanceolate, with a decurrent keel. Cymes terminal. *Calyx* obtuse, smooth, except at the back of each stamen.—Found at the Cape, and first described by Bergius. Linnæus originally referred the description of this author to his own *Th. capitatum*, from which scarcely any species can be more distinct. In general dimensions, and shrubby habit, indeed they are not unlike; but the *leaves* of the present plant are much fewer, and more distant, and the *inflorescence* totally different, being a sort of compound irregular *umbel*, or *cyme*. The *calyx* being smooth both within and without, except a slender tuft of hairs at the back of each *stamen*, as observed by Mr. Brown, reduces this species to a different section, according to that author, along with *squarrosum*, n. 8, *fragile*, n. 16, and some others. A note at the back of one of the Linnæan specimens of *Th. striatum*, gathered by Sparrmann, says "the fruit is a *drupa*, like that of *Prunus Padus*." If so, this species should seem referrible to some other genus, as *Fufanus*; yet their habits are too dissimilar.

15. *Th. umbellatum*. Umbel'd Thesium. Linn. Sp. Pl. 302. Willd. n. 11. Ait. n. 2. Pursh n. 1. (*Centaurium luteum aleyroides virginianum*; Pluk. Mant. 43. Phyt. t. 342. f. 1.)—Flowers umbellate. Leaves elliptic-oblong.—On dry hills and fields, from New York to Carolina. Perennial, flowering in June and July.—*Flowers* white. Pursh. Mr. Aiton records its having first been introduced into the British gardens in 1782, by the late Dr. Hope, professor of botany at Edinburgh. This is an herbaceous species, about a foot high, erect, scarcely branched, except at the top, and having more of the aspect of some annual *Euphorbia*, than of the genus of which we are treating. The *leaves* are scattered, on short stalks, erect, smooth, nearly oval, about an inch long. *Flowers* three or four together in small *umbels*, on slender, solitary *stalks*, either axillary or terminal. *Bractæas* three or four under each *umbel*, pale, lanceolate, deflexed. Mr. Brown says the character of the *flower* of this, the only American species, is between *Fufanus* and *Santalum*. Of the *fruit* nothing is known.

16. *Th. fragile*. Brittle Thesium. Linn. Suppl. 162. Willd. n. 12. Thunb. Prodr. 45.—Leaves three-edged, somewhat ovate, keeled, decurrent. Stem angular. Flowers axillary, sessile.—Discovered by Thunberg at the Cape of

Good Hope. We have seen no specimen of this species. It is said to have the habit of a *Salsola*, and to be extremely brittle. The *leaves* are so very short, that at first sight they seem to be altogether wanting.

17. *Th. paniculatum*. Panicked Thesium. Linn. Mant. 51. Willd. n. 14. Thunb. Prodr. 45.—Stem much branched; branches diffuse, panicked, angular, many-flowered. Flowers solitary, stalked. Leaves awl-shaped.—From the Cape of Good Hope.—The *stem* is round, shrubby, with several round primary *branches*, subdivided throughout into many lateral and terminal, slender, angular ones, repeatedly and irregularly cloven and forked, bearing innumerable, small, terminal, stalked, solitary *flowers*, each of which is subtended by four or five sharp awl-shaped *bractæas*, which Linnæus describes as an inferior, but not a proper, *calyx*. The real *calyx* is obtuse and five-cleft. *Fruit* like Corianderseed. Many of the *flowers* are abortive. The *leaves* are scattered, and for the most part very minute. Mr. Brown does not mention this species, perhaps from not having been able to examine the inside of the *flowers*.

18. *Th. ericoides*. Heath-like Thesium. Herb. Banks. Brown Prodr. Nov. Holl. v. 1. 353.—Stem much branched, panicked; branches erect, many-flowered. Flowers capitate. Leaves lanceolate, channelled, decurrent, acute.—Native of the Cape of Good Hope. This has a round shrubby *stem*, with the panicked habit, and innumerable small *flowers*, of many *Ericæ*. The younger Linnæus confounded it very negligently with the last, and it seems to have passed undescribed, being only mentioned in Mr. Brown's work, by the apt name it bears in the Banksian herbarium. The *leaves* are pretty numerous, minute, spreading, concave, broad at the base; decurrent at the margins and keel. *Flowers* sessile, two, three, or four, in each little terminal head, accompanied by several imbricated, ovate, keeled, sheathing *bractæas*, partly jagged or fringed at the edges. These *bractæas* evince the true nature of what Linnæus terms, in the foregoing, an inferior *calyx*.

19. *Th. amplexicaule*. Heart-leaved Thesium. Linn. Mant. 213. Willd. n. 15. Ait. n. 3.—"Clusters terminal. Leaves heart-shaped, sessile."—Native of lofty hills at the Cape of Good Hope.—*Stem* rather woody, erect, somewhat angular, four feet high, smooth. *Leaves* alternate, sessile, clasping the stem, heart-shaped, entire, rather acute, smooth, thickish, an inch long. *Clusters* terminal, consisting of minute *flowers*, intermixed with large ovate *bractæas*. Linnæus. Neither Mr. Brown nor professor Thunberg mention this species. There is no authentic specimen of it in the Linnæan collection, and we are almost convinced of its being the same plant as the following. Willdenow has made a singular mistake in copying the specific character of *Th. Frisca*, see n. 9, over again, for the *amplexicaule*, which stands above it in the *Mantissa*.

20. *Th. euphorbioides*. Spurge-like Thesium. Berg. Cap. 74. Linn. Mant. 214. Willd. n. 17. Thunb. Prodr. 46. (*Planta africana frutescens, portulacæ foliis, Morgani Syrorum, ex brevi pediculo binis, similis*; Pluk. Amalth. 173.)—Stalks three-flowered, terminal. Leaves roundish-ovate, acute, fleshy. Stem shrubby, with alternate corymbose branches.—Native of the Cape of Good Hope. This was adopted from Bergius by Linnæus, without seeing a specimen, at least from that author. One is preserved in his own herbarium, on which he had written *Thesium capense*, which his son altered to *euphorbioides*, considering it as the same with the plant of Bergius. A similar specimen lies in the Banksian collection for *Th. amplexicaule*. Both names are excellent, but perhaps *euphorbioides*, as the original

original one, ought to be preferred. The plant is of a stout shrubby habit, turning black in drying. *Leaves* about the size of the finger-nail, alternate, sessile, ovate or rather heart-shaped, clasping the stem, acute, entire, fleshy, smooth, without rib or veins. *Flowers* about the tops of the alternate corymbose upper branches, enveloped in *bractææ*, like the leaves, but smaller. Tube of the *calyx* very short, and strongly angular; limb smooth within, except perhaps a few minute hairs behind the *stamens*, indicated by Mr. Brown. *Fruit* globose, chiefly angular at the top.

21. Th. *triflorum*. Three-flowered Thesium. Linn. Suppl. 162. Willd. n. 16. Thunb. Prodr. 46.—“Leaves lanceolate. Stem angular. Flower-stalks axillary, three-forked, compound.”—Gathered by Thunberg at the Cape. The *flower-stalks* are three-flowered, sometimes divided, or three-cleft, greatly divaricated. Linn. We have met with no specimen answering to this species, nor does Mr. Brown advert to it.

22. Th. *spinosum*. Spinous Thesium. Linn. Suppl. 161. Willd. n. 19. Thunb. Prodr. 45.—Leaves awl-shaped, spinous-pointed, spreading, fleshy, decurrent. Flowers axillary, stalked, solitary.—Gathered by Thunberg at the Cape. A very singular species, whose woody decumbent stem is beset with numerous, ascending, simple branches, two or three inches long, clothed with alternate, horizontally projecting, pungent leaves, one-third of an inch in length, giving the plant the aspect of an *Ulex*. *Flower-stalks* about as long as the leaves.—Mr. Brown places this in his section of such Cape species as have the *calyx* internally naked, except a slender tuft of hairs behind each *stamen*. With it ranges *squarrosum*, *fragile*, *striatum*, *spinosum*, *ericoides*, *euphorbioides*, and one unknown to us, called *sparteum*. The section whose *calyx* is lined with a dense deflexed beard, consists of *Prisea*, *funale*, *spicatum*, *capitatum*, and *scabrum*, besides five species unknown to us, called *crassifolium*, *teretifolium*, *debile*, *ciliatum*, and *divaricatum*.

THESMOPHORIA, Θεσμοφορία, in *Antiquity*, a festival in honour of Ceres, which was celebrated by many cities of Greece; but especially the Athenians observed it with great devotion and pomp. For the ceremonies of this solemnity, see Potter, *Archæol. Græc.* tom. i. p. 403, seq. See CEREALIA and ELEUSINIA.

THESMOTHETÆ, Θεσμοθέται, an appellation given to six of the nine Athenian archons; the first and chief of the nine was called, by way of eminence, *archon*; the second in dignity was called *basileus*; the third, *polemarchus*; and the other six, *thesmothetæ*: for an account of whose power and jurisdiction, see Potter, *Archæol. Græc.* tom. i. p. 77.

THESPANIS, in *Ancient Geography*, a river of Asiatic Sarmatia; the mouth of which, according to Ptolemy, lay between that of Rhembitus and the town of Azara.

THESPHATA, Θεσφάταια, in *Antiquity*, an appellation given to oracles. See ORACLE.

THESPIA, or THESPIÆ, in *Ancient Geography*, a town of Bœotia, situated at the foot of mount Helicon, about 50 stadia from the city of Thebes. The Thebans, who destroyed this city, spared nothing but the sacred monuments, among which were the temple of Hercules, which was served by a priestess restricted to celibacy during her whole life, and the statue of that Cupid (or Cupidon), sometimes confounded with the god of love, which was only a shapeless stone as it was dug in the quarry, for thus the objects of public worship were represented in ancient times. Praxiteles is said to have formed a statue of Cupidon of Penthelic marble; and Lyfippus made one of bronze.

The Thespians reported, that the statue of Praxiteles was taken away by Caius, the Roman emperor; but others say, that it was returned by Claudius, and that Nero removed it to Rome, where it was consumed by fire. This statue was so beautiful, that, according to Cicero, Thespia was visited merely for the sake of seeing it. The Cupidon that existed in the time of Pausanias was an imitation of that of Praxiteles by Menodorus, the Athenian; but here were a Venus and Phyrné in marble, executed by Praxiteles himself. In one quarter of the city was a temple consecrated to Venus Melenis. The theatre was a beautiful structure, ornamented with a statue of Hesiod in bronze. Near it was a Victory in bronze, and a chapel consecrated to the Muses, each of which had a small statue in marble. At Thespia there was a statue of Venus in marble, made by Praxiteles.

THESPIADES, in *Mythology*, an appellation given to the Muses from the city of Thespia, where they were honoured.

THESPIÆ, in *Ancient Geography*, a town of Thessaly, in Magnesia.

THESPIANA, the name of an antidote intended for internal abscesses.

THESPIA, in *Biography*, an ancient poet, and the supposed inventor of tragedy, was born in a small borough of Attica, named Icaria, and he, as well as Sufarion, a native of the same place, appeared each at the head of a company of actors, one on a kind of stage and the other in a cart. Sufarion attacked the vices and absurdities of his time, and represented his first pieces towards the year 530 B.C. Thespis treated nobler subjects, which he drew from history: he appeared some years after Sufarion, made his first attempts in tragedy, and acted his *Alceas* in the year 536 B.C. He was followed in this species of drama by Æschylus, Sophocles, and Euripides. Thespis having observed at the festivals, in which before his time hymns only were sung, one of the singers, mounted on a table, forming a kind of dialogue with the chorus, took the hint of introducing into his tragedies an actor, who by simple recitals, introduced at intervals, should relieve the chorus, divide the action, and render it more interesting. This innovation, together with some other liberties in which he indulged himself, alarmed Solon, the legislator of Athens, who condemned a species of composition, in which the ancient traditions were disguised by fiction. “If we applaud falsehood in our public exhibitions,” said he to Thespis, “we shall soon find that it will insinuate itself into our most sacred engagements.”

The excessive approbation and delight with which both the city and country received the pieces of Thespis and Sufarion, at once justified and rendered useless the suspicious foresight of Solon; the poets, who till that time had only exercised their genius in dithyrambs and licentious satire, struck with the elegant forms which these species of composition began to assume, dedicated their talents to tragedy and comedy. See TRAGEDY.

Thespis, according to the description of Horace, extended his plan farther than the introduction of a single actor in the intervals between the songs of the chorus, to the representation of some fable by actors on a kind of moveable stage, who alternately sung and played, with their faces stained by the lees of wine.

“Ignotum tragicæ genus invenisse Camœnæ  
Dicitur, et plaustris vexisse poemata Thespis,  
Quæ canerent agerentque peruncti sæcibus ora.”

Art. Poet.

Some writers have mentioned three pieces of Thespis, viz.

viz. "The Contest of Pelias or Phorbas;" "The Sacred Youths;" and "Pentheus." Socrates says that he represented tragedies in the 61st Olympiad, long after Solon's death. Travels of Anacharsis, vol. vi. 8vo.

THESPIUS, in *Ancient Geography*, a river of Greece, in Bœotia.

THESPROTI, a people of Epirus, who inhabited Thesprotia, in the vicinity of the Ambraciates; and formed one nation with the Chaonians. They derived their name from Thesprotus, the son of Pelafgus, who was the son of Lycaon, and who was the first that conducted the Pelafgi into Epirus.

THESPROTIA, or THESPROTIS, a small country of Epirus, S. of Chaonia, having to the E. the lake Ambracius and Ambracia, and to the S. the sea. This country was watered by three rivers, which ran from W. to E, viz. Thiamis, Cocytus, and Acheron.

THESSALIA, THESSALY, a celebrated country of Greece. This country, comprising Magnesia and other small districts which have particular denominations, is bounded to the E. by the sea, to the N. by mount Olympus, to the W. by mount Pindus, and to the S. by mount Oeta. From these permanent boundaries branch out other chains of mountains and hills, that wind through the country, occasionally embracing fertile plains, which, from their form, and the manner in which they are inclosed, resemble vast amphitheatres. Opulent cities are seated on the heights that encircle these plains; and the whole country is watered by rivers falling in general into the Peneus, which, before it loses itself in the sea, flows through the famous valley of Tempé. The Aphidanus, or Apidanus, proceeded from the S. where was Dolopia, ascended northward (see PENEUS), traversed the plains of Pharfalia in the Thessaliotide, and discharged itself into the Alphens, W. of Larissa. (See APIDANO.) The Onchestus, or Onchestones, took its rise S. of Larissa, passed by the Palus Bœbeis, and after having received the Naurus, discharged itself into the Pelafgic gulf, between Demetrius on the left and Pagasæ on the right. The Sperchius commenced S.W. in an angle which was formed by the chains of Pindus with those of mount Oeta, ascended N.E., watered Sperchium, turned to the E., and having passed Hypata, received the Achelous of Thessaly, which proceeded from mount Othrys, and being joined by the Lamina, discharged itself into the Maliac or Lamiac gulf. The country was marshy, and abounded with a variety of plants, some of which were medicinal and fanative, and others venomous and pernicious. The knowledge of their different properties caused the Thessalians to be regarded as a class of forcerers, who possessed the art of producing supernatural effects. The principal people of Thessaly were the Æthices, situated towards the N.W., whose chief town was Oxinia, near a lake that lay between small chains of mountains:—the Pelagoni Tripoliti, in a kind of hollow territory, separated from Macedonia by a chain of mountains, called Cambrunii montes; denominated Tripolitans on account of their three towns, Dolicha, Pythium, and Azorus: in the eastern part of this territory was the Afcuris palus, or marsh Afcuri:—the Perrhæbi, lying S. of the mountains which formed this territory, and extending from W. to E., the N. of the Peneus:—S. of the Peneus, towards the W., was the Estixotis, watered by the rivers Ion and Thœus, and bounded W. and S. by mount Pindus: its most considerable towns being Gomphi, Trica, Pelinaron, and Pharcadon:—the Pelafgiotis, towards the E., having the Peneus to the N. and commencing W. from the Apidanus, which received the Enipeus, that passed to Phar-

sal: the principal towns of this part of Thessaly were Larissa, reckoned the capital of Thessaly; Pharfala, one of the largest and most opulent towns, now Pharfalia, Scotussa, Cranon, &c.:—the Thessaliotis being to the S. and watered by the Enipeus in the lower part of its course, and having to the S. mount Othrys, and to the S.W. Dolopia; its principal town was Melitæa upon the Enipeus:—the Phtbiotis, towards the S.E., terminating in a peninsula, and watered by the Sperchius and Achelous; its principal towns were Pheræ, to the N.; Thaumaci, to the W., commanding one of the finest prospects in Greece; Alos and Lamia, towards the middle; Phalara, at the bottom of the Amaliac gulf; in the peninsula, Thebæ, Larissa, Cremaita and Echinus: at the extremity the port of Aphetæ, and S.E. Heraclea Trachina, the road from which led to the straits of *Thermopyla*; which see. Magnesia was separated from the sea by mount Pelion: here were the towns of Demetrius and Iolcœ, and S.E., on the eastern coast, the town of Magnesia, and at the extremity of the peninsula to the S.W. the town of Antium. At the bottom of the Pelafgiotic gulf were the two small islands of Deucalion and Pyrrha. Dolopia lay towards Ætolia, and contained no considerable towns. The extremity of the S.E. of Magnesia was terminated by the promontory Sepias, where the fleet of Xerxes was battered by a tempest. The town of Gonnus, at the entrance of the valley of Tempé, was the key of Thessaly on the side of Macedonia, as the post of *Thermopyla* was on the side of Phocis. See THESSALY.

The several nations which we have recounted, as properly Thessalian, were formerly governed by kings, but after various revolutions became for the most part subject to an oligarchy. The states and the towns were independent of each other. The confederacy of the Thessalians, properly so called, was the most powerful of all, both from the number of towns pertaining to it, and from the accession of the Magnesians and Perrhæbians which were brought almost under complete subjection. There were some free cities, unconnected with any of the states. The Thessalians could bring into the field an army of 6000 horse and 10,000 infantry, exclusively of their archers, who were excellent, and who from their infancy were accustomed to draw the bow. The Thessalians are said to have been the first who managed horses with the bit, and used them in battle; and hence, it is said, originated the tradition that a race of creatures, called centaurs, half horse and half man, formerly existed in Thessaly. This country produced wine, oil, and fruit of different kinds. The land has been represented to be so rich, that the corn grew too fast, if it were not cut, or sheep turned in to graze upon it. They carried on a considerable commerce in corn. The Thessalians, though they boasted of their liberty, were the first to reduce Greeks to slavery. Amongst them they had a prodigious number of slaves, known by the name of Pencstæ. These people are very hospitable to strangers, and treat them magnificently. In their dress and houses luxury is conspicuous; and at their entertainments they hire dancing girls to amuse them. They are reckoned passionate and turbulent, and very difficult to be governed; and they are reproached with insincerity and falsehood. They have cultivated poetry from their most early ages, and pretend that Thessaly gave birth to Thamyris, Orpheus, Linus, and many others who lived in the heroic age; but since that period, they have produced no writer nor any celebrated artist. They were much addicted to dancing; and in some places generals or magistrates were called chiefs of the dance. Their music observes a medium between the Doric and Ionic, and accordingly harmonizes with the character and manners of the country.

country. They have never on any occasion killed storks, and the same punishment was inflicted on a person who killed one of these birds as if he had taken away the life of a man. This law, it is said, was founded on the circumstance, that storks had freed Theffaly from the enormous serpents which formerly infested it.

**THESSALICUM SÆDILE**, the Theffalian chair, so called from Theffaly, where chairs of this figure were most in use: it is recommended by Hippocrates, Lib. de Art. in place of a machine for reducing a recent luxation of the shoulder-bone. The back of this chair is perpendicular to the seat, as Galen tells us, by which construction it is distinguished, and accommodated to the operation.

**THESSALIOTIS.** See **THESSALIA**.

**THESSALON**, in *Geography*, a river of Canada, which runs into lake Huron, N. lat. 49° 6'. W. long. 82° 8'.

**THESSALONIANS**, *Epistles to*, in *Scripture History*. See **EPISTLE**.

**THESSALONICA**, in *Ancient Geography*, a town of Macedonia, situated on the Thermaic gulf; and built on the declivity of a mountain in the form of an amphitheatre, the summit of which was defended by a castle of great extent. Strabo says that it was named "Therma," and that it was only a village; that Cassander augmented it considerably, and transported hither the inhabitants of some neighbouring cities, and gave it the name of Theffalonica, that of his wife, the sister of Alexander the Great. In the year 168 B.C., Macedonia was divided into four parts, and Theffalonica was the capital of the second part. Its government was regulated by magistrates, called "Political." Under the Greek empire it continued to be governed by a senate. Cicero, during his exile, passed some time at Theffalonica. This city had several divinities, and also emperors, who were objects of public worship. Jupiter was the principal; Apollo was also represented on its monuments; and the Cabiri had a temple in Theffalonica. The Cabirian and Pyrrhic games were exhibited in this city in honour of the Cabiri, and the Olympic games were celebrated in honour of Jupiter. That rich and powerful city had, for its spectacles and the amusement of the citizens, an amphitheatre for the combats of gladiators, and a circus for the public games. The emperors Valerian and Gallienus gave it the title of a colony. It had also the title of Neocorus. The modern name of Theffalonica is *Salonica* or *Saloniki*. (which see.) Although there are different routes by which goods are transported from Macedonia into the Austrian dominions, the best, says Dr. Holland in his Travels into Albania, &c. is through Bulgaria, by Widin and Osovo, where it enters the Austrian territory, and is thence continued through the Bannat by Temeswar, Pest, Raab to Vienna. The goods landed at Salonica are made up in packages of 1½ hundred weight, and two of these are the load of a horse. The cavalcades for this inland journey consist often of 200 or 300, and sometimes of 1000 horses. The property so transported, at a moderate estimate, might be worth 30,000*l.* on its arrival in Germany. The time occupied between Salonica and Vienna was in general thirty-five days, exclusive of the quarantine at Osovo, which sometimes took place. The cavalcades usually travel eight hours in the twenty-four.

**THESSALY**, or **JANNA**, in *Geography*, a province of European Turkey, bounded on the N. by Macedonia, on the E. by the Archipelago, on the S. by Livadia, and on the W. by Livadia and Epire, anciently called *Theffalia*, *Pelassia*, and *Pyrrhæa*, (see **THESSALIA**,) and now by the Turks *Janna*. It was sometimes annexed to Macedonia, and sometimes separated from it. The celebrated mount

Pindus, now Messova, or Messo Novo, separated it from Epirus, or a part of the present Albania. Amongst its once celebrated twenty-four mountains, the most remarkable are Olympus, Pelion, and Ossa. Here are also situated the plains of Pharfalia, and the delightful valley of Tempé. The country is extremely fertile, and retains its ancient character in this respect. It produces oranges, citrons, lemons, pomegranates, very sweet grapes, excellent figs and melons, almonds, olives, cotton, and chestnuts, which take their name from Castanea in Magnesia. The modern Theffalians are a well-made spirited people. The most remarkable places in the country are Larissa and Janna. See **THESSALIA**.

**THESTIA**, in *Ancient Geography*, a town of Epirus, in Acarnania.—Also, a river of the Peloponnesus, in Laconia.

**THESTIDION**, a town of Greece, in Theffaly.

**THESTIS**, a town which belonged to the Arabs.—Also, a town of Africa, in Libya.—Also, a fountain of Africa, in the Cyrenaica, near Irafra.

**THETA**, Θ, among the *Ancients*, one of the Greek letters. It was used as a mark on the ballots of judges, by which they condemned the person to death, it being the first letter of the word Θάνατος, *death*. Whence it had the epithet of *niger* and *infelix*, thus:

"O multum ante alias infelix litera theta."

**THETES**, Θητες, in *Antiquity*, the lowest class of people at Athens. Aristides repealed Solon's law by which the thetes were made incapable of bearing any office in the government.

**THETFORD**, in *Geography*, an ancient borough and market-town, partly in the hundred of Shropham, and county of Norfolk, and partly in the hundred of Lackford, in the county of Suffolk, England, is situated at the distance of 28 miles S.W. from Norwich, and 80 miles N.N.E. from London. It was a place of considerable consequence at an early period.

Thetford, called in the Saxon Chronicle *Theodford*, has an acknowledged claim of having been once the seat of the East Anglian kings. Being the metropolis of that portion of the heptarchy, it became subject to the ravages of the Danes, by whom it was repeatedly laid in ashes. From numerous coins, it is evident that there was a mint at Thetford from the time of Athelstan to the reign of king John. At the eastern extremity of the town are some extensive remains of fortifications, consisting of a large artificial mount, or keep, with lofty banks and deep ditches. These fortifications were probably first formed by the early kings of East Anglia, and the keep an addition, made subsequent to the Norman conquest. East of the mount is a large area, or place of arms, three hundred feet square. The mount is about one hundred feet in height, and nine hundred and eighty-four feet in circumference, at the base. The slope is extremely steep; and yet no traces remain of any path or steps for the purpose of carrying up machines or weighty ammunition.

In the Conqueror's time, Herfast having removed the episcopal see from North Elmham to Thetford, the latter became the head of the East Anglian diocese; but in the succeeding reign, the see was transferred to Norwich. The ruins of ecclesiastical and other buildings strongly point out the ancient splendour of this town. At one period it is said to have had twenty churches, answerable to the number of parishes, and eight monasteries, besides other religious and charitable foundations. But of these, the names only of some remain; and of others, a few dilapidated walls serve

to mark their sites. Of the twenty churches, three only are preserved; St. Peter's, and St. Cuthbert's, on the Norfolk side of the river; and St. Mary the Less on the Suffolk side. St. Peter's, commonly called the Black church, from its being constructed chiefly of flint, consists of a chancel, nave, two aisles, and a tower. The latter was rebuilt in 1789, when a great part of the church was also re-edified. The battlements on the south side, and the buttresses, are decorated with allusive ornaments and large letters inlaid in the flint work.

The *Nunnery* was founded by Uvius, the first abbot of St. Edmund's Bury, in the reign of king Canute; in commemoration of the number of persons who fell at Snarehill, near this town, in the sanguinary conflict between king Edmund's army and the forces under the Danish leaders Ingwar and Ubba. A few monks were placed in this monastery, which was then considered as a cell to Bury Abbey. In the year 1176, the monks, being reduced to two, resigned, by the request of the abbot of Bury, who placed in their stead a convent of nuns, who had previously resided at Lynn. At the dissolution, the revenues and site were granted to sir Richard Fulmerston, who made this house his residence. It was afterwards let to a farmer, and some years since the greater part was taken down: a new farm-house was built of the materials, and the conventual church converted into a barn. Some of the walls, with buttresses, windows, &c. still remain.

The *Priory or Abbey* was founded by Roger Bigod, in the year 1104, for monks of the Cluniac order. This was a peculiarly privileged house; for other Cluniac monasteries were subject to have their revenues seized, on a war breaking out between England and France, because being dependant on the abbey of Clugny, in Burgundy, the monks were considered as foreigners; but the religious persons of this monastery were naturalized, and treated as other subjects of the realm. At the suppression the revenues were granted to the duke of Norfolk, and are now the property of lord Petre. The ancient gateway, constructed with freestone and black flint, with parts of the church, &c. still remain. This monastery had been the burial-place of the several noble families who had successively borne the title of earls of Norfolk.

*St. Austin's Friary* was founded by John of Gaunt, duke of Lancaster, in the year 1387, for friars mendicant of the Augustine order. The site, granted to sir Richard Fulmerston, is still called the Friar's Close.

The *Monastery of St. Sepulchre* was founded in 1109, by William, earl of Warren and Surrey, for canons of the Augustine order, and additionally endowed by king Henry II. The site is still called Canons: part of the conventual church, yet standing, has long since been used as a barn. The gate of the porter's lodge, and some other parts of the buildings, remain. Of the other four religious houses, no vestiges are now left. In the Suffolk part of the town, near St. Mary's church, is a free grammar-school. In the year 1566, sir Richard Fulmerston bequeathed property for the erection of a free-school, with dwelling-houses and salaries for a master and usher; and also habitations and weekly pensions for two poor men and two poor women. The benevolent design of the donor, however, was not carried into effect till the time of James I., when it was enacted by authority of parliament, that there should be for ever a free grammar-school and hospital; and that the master, usher, and the four poor people, should be a body politic, under the title of "The master and fellows of the school and hospital at Thetford, founded by king James the First, according to the will of sir Richard Fulmerston, *kat.*"

Thetford, though a very ancient burgh, is comparatively a modern corporation. In the time of the Conqueror, the town was governed by a consul and other inferior officers. Not being a free burgh, it suffered greatly at times by the oppression of the officers nominated by the crown. But in the year 1573, queen Elizabeth granted a charter, by which a mayor, ten aldermen, twenty common-councilmen, a recorder, town-clerk, sword-bearer, and two serjeants at mace, constitute the corporation. The mayor for the time being is clerk of the market, and in the year after his mayoralty officiates as coroner. The corporation had also permission to send two burgesses to parliament, "provided they were discreet and honest men, and were elected at the expence of the borough." This charter was surrendered to the crown in the thirty-fourth year of Charles II., and a very imperfect one obtained in its stead. But in 1692 an order was procured from the court of chancery for cancelling the surrender, and procuring a transcript of the charter granted by Elizabeth, under which the town is at present governed. Thetford has been honoured with the presence of many of our sovereigns, particularly Henry I. and II. Several charters, granted by the former, bear date from this town. When the manor fell with the duchy of Lancaster, of which it formed a parcel, to the crown, the ancient seat of the earls Warren became the royal palace. This was rebuilt in the time of queen Elizabeth, who occasionally resided here. King James I. made it one of his hunting seats; but being disgusted with the abrupt remonstrance of a farmer, over whose lands he had been hunting, he gave the palace to sir Philip Wodehouse: it has been rebuilt, and is now the property of a private gentleman; but still bears the appellation of the "King's House." The old guildhall or council-house being in a dilapidated condition, sir Joseph Williamson, secretary of state to king Charles II., erected at his own expence the present council-chamber, and the apartment for the juries. Thetford has been much improved within the last twenty years. A new bridge has been built, the principal street paved, and several handsome houses have been erected. The navigation of the river has been attended to, and by this communication some mercantile business is transacted in the corn and coal trade. Five fairs are held annually, and a market weekly on Saturdays; but, compared with its former greatness, it is now a very inconsiderable place. The population in the return of the year 1811, was stated to be 2450, occupying 530 houses.

Near to Thetford is a mineral spring, the waters of which possess considerable virtues, though their celebrity has by no means been commensurate with their acknowledged efficacy. Thomas Paine, well known for his political and theological tracts, was a native of this town, and received his education in the grammar-school.—Blomefield's *Essay towards a Topographical History of Norfolk*, vol. ii. *Beauties of England and Wales*, vol. xi. by John Britton, *F.S.A. History, &c. of Thetford*, by Thomas Martin, 4to.

THETFORD, a town of the United States, in the county of Orange, Vermont; 10 miles N. of Hanover; containing 1735 inhabitants.

THETIS, in *Mythology*, the name of the most beautiful of the Nereids.

THEVACOURCHY, in *Geography*, a town of Hindoostan, in the Carnatic; 20 miles W.S.W. of Tiagar.

THEUDORIA, in *Ancient Geography*, a town of Achaia, from which the Macedonians were driven by the Romans.

THEUDURUM, a town of Lower Germany, on the route

route from Colonia Trajana to Colonia Agrippina, between Mederiacum and Coriovallum. Anton. Itin.

**THEVEN**, in *Geography*, a town of Persia, in the province of Laristan; 40 miles E. of Lar.

**THEVENARD**, GABRIEL VINCENT, of Paris, in *Biography*, born in 1669, became in the operas of Lulli the first singer and actor of his time. He had a tenor voice, which made the public forget that of Beaumavielle; it was sonorous, mellow, and extensive in compass. He sung a little through the throat, but by dint of art, he found the means of rendering this little defect even agreeable. His appearance on the stage was dignified, and his performance wonderful! It was to him that the present manner (1780) of speaking recitative is due. He excelled above all in singing at table; nor has he ever been surpassed in that talent, except by De Chassé and Jeliote, who so many years delighted their friends.

He sung more than forty years at the Opera, and only retired in the year 1730. He was more than sixty years old, when, seeing a beautiful female slipper in a shoemaker's shop, he fell violently in love, unsight, unseen, with the person for whom it was made; and having discovered the lady, married her, after obtaining the consent of an uncle on whom she was dependent, with the assistance of many bottles of wine which they cracked together with the utmost cordiality, and which Thevenard meliorated with the charms of his voice.

He died at Paris in 1741, at the age of 72. Thevenard was the cause of the duke d'Antin quitting the management of the opera. This singer having a pension offered him for his services, found it so inconsiderable, that he refused to accept of it, saying it was only fit for his footman. The duke, piqued at this insolence, would have sent him to prison; but it having been represented to him that the public would suffer by his absence, he sacrificed to this consideration his resentment; but determining to have nothing more to do with such people, he quitted the superintendance of the opera. Laborde.

**THEVENOT**, JOHN, a traveller in the Levant, was born in Lorraine, and after repeated journies, died in Persia in 1667. He is said to have introduced the use of coffee into France. His "Voyage in Asia" was published in 1664, which is a work considerably esteemed, and has been often re-edited. The Amsterdam edition in 12mo., 1727, is comprised in 5 vols. Nouv. Dict. Histor.

**THEVENOT**, NICHOLAS MELCHISEDEC, a writer of travels, was born in 1621, probably at Paris, and having finished his studies, indulged his propensity for visiting foreign countries, confining himself chiefly to various parts of Europe. Some persons have given him the credit of being a great linguist, but this is disputed by Huet, who was personally acquainted with him. The result of his observations and inquiries was published in a "Collection of Voyages and Travels," comprised in 4 vols. fol. from 1663 to 1672. Thevenot was a great collector of books, consisting of more than 2000 volumes, in which the royal library, of which he was keeper, was deficient. Nointel, on returning from his embassy to Constantinople, enriched this collection by a present of his marbles, inscriptions, and bas-reliefs. He died in 1692. From various MSS. in the royal library, he had compiled "The Works of Ancient Mathematicians," an edition of which was published after his death. Moreri. Huet.

**THEVET**, ANDREW, a traveller and writer, was born at Angouleme in 1502; and being desirous of visiting foreign countries, he obtained, by the interest of the cardinal of Lorraine, an opportunity of going to Jerusalem. His

travels in the Levant occupied him from 1549 to 1554; and after his return to France, he accompanied the sieur de Villegaignon, in 1555, to found a colony in Brazil. In 1556 he took the habit of an ecclesiastic, and was appointed almoner to queen Catharine de Medicis. He also obtained the titles of historiographer and cosmographer royal, and died at Paris in 1590, at the advanced age of 88 years. Besides other works, he published "Cosmographie du Levant," 1554, 4to.; "Les Singularités de la France Antarctique," 1588, 4to.; and "Cosmographie Univerfelle," 2 vols. fol. 1575; but unfortunately his veracity is questionable. Moreri.

**THEVESTE**, TIFFESTE, in *Ancient Geography*, a town of Africa, situated on a delightful plain in the interior of the country, on the banks of a river, E. of Sigus, and E.S.E. of Cirta. In Anton. Itin. this town has the title of a Roman colony, and is placed on the route from Carthage to Cæsarea, between Ammedara Colonia and Attaba.

**THEVET**. See **TEBET**.

**THEVETIA**, in *Botany*, a name given by Linnæus, in his *Hortus Cliffortianus* 75, to a genus distinguished by Plumier, and other authors, under the American appellation of *Abouai*. The person commemorated by the above name was André Thevet, a French monk, who travelled to Brazil, of which he published an account in 1554, under the title of *Les Singularitez de la France Antarctique, autrement nommée Amerique*, &c. Of this book there are several editions, with rude wooden cuts, and some accounts of plants, amongst which the *Abouai* is, for the first time, described. The author, according to De Theis, died in 1590, about the age of eighty-eight. Haller says he has injudiciously applied passages in the writings of the ancients to the productions of the new world; and that he has described many countries which he never visited. Linnæus himself appears not to have been satisfied with the honour he was conferring, for he says he should not be displeased with any person who might change this name for another. He subsequently retained it as a specific name only, when the genus in question was sunk in his own **CERBERA**. See that article.

**THEU-PROSOPON**, in *Ancient Geography*, a promontory of Phœnicia, between Tripolis and Botrys. Mela calls it Euprosopon.

**THEURGY**, θεουργία, a name which the ancients gave to that sacred part of magic which we sometimes call *white magic*, or the *white art*.

The word is formed from θεός, *God*, and εργον, *work*; *q. d.* the art of doing divine things, or things which God alone can do: or the power of working extraordinary and supernatural things, by invoking the names of God, saints, angels, &c.

Accordingly, those who have written of magic in the general, divide it into three parts: the first of which is called *theurgy*, as operating by divine or celestial means; the second, *natural magic*, performed by the powers of nature; and the third, *necromancy*, which proceeds by invoking dæmons.

This theurgy, or pretended art of so purging and refining that faculty of the mind, which receives the images of things, as to render it capable of perceiving the dæmons, and of performing many marvellous things by their assistance, was adopted by the disciples of Ammonius towards the close of the second century. Ammonius, the founder of the sect of modern Platonics (see **PLATONISM**), with a view of reconciling the popular religions of different countries, and particularly the Christian, with his own system, turned into mere allegory the whole history of the gods, and maintained that those beings, whom the priests and people dignified with this

title, were no more than celestial ministers, to whom a certain kind of inferior worship was due. He acknowledged Christ to be a most excellent man, the friend of God, and the admirable theurge; but denied that it was his intention entirely to abolish the worship of demons, and of the other ministers of divine providence; affirming, on the contrary, that he merely purified the ancient religion, and that his followers had manifestly corrupted the doctrine of their divine master. Mosh. Eccl. Hist. vol. i. 8vo.

THEUTIS, in *Ancient Geography*, a small town of Arcadia, S. of the river Lodon, and near that of Tuthoa.

THEUX, in *Geography*, a town of France, in the department of the Ourthe; 5 miles N.W. of Spa.

THEXIS, a word used by the old medical writers, sometimes for wounds made by puncture with small instruments, and sometimes for the operation of the future, or the sewing together the lips of a wound, to make it heal with a less scar.

THEYA, in *Geography*. See TEYA.

THEYE-CHEEKE LAKE, a lake of North America. N. lat. 65°. W. long. 109°.

THEYE-NOYE-KYED LAKE, a lake of North America. N. lat. 64° 10'. W. long. 108°.

THEYHOLEKYED LAKE, a lake of North America. N. lat. 62°. W. long. 102° 5'.

THEYSSE, a river which rises in the E. part of Hungary, on the borders of Poland, and runs into the Danube; 19 miles N.W. of Belgrade.

THEZE, a town of France, in the department of the Lower Pyrenees; 12 miles N. of Pau.

THIA, or DIVINE, in *Ancient Geography*, an island which, A.D. 46, was under the empire of Claudius. It was one of the Cyclades, situated between Thera and Therasia. It either disappeared, or was reunited to that of Hiera towards the year 726, on occasion of a violent eruption which took place at that time.

THIA, a town of Cappadocian Pontus, upon the route from Trapezunte to Satala, between Zigana and Sediscafisonti. Anton. Itin.

THIACAR, in *Geography*, a town of Thibet; 75 miles S.E. of Lassa.

THIAGOLA, in *Ancient Geography*, a name given to the most northerly mouth of the Danube, and to the marsh which it forms before it runs into the Euxine sea.

THIAN, in *Geography*, a town of the county of Tyrol; 13 miles W. of Bolzano.

THIAR, in *Ancient Geography*, a town of Spain, upon the route from Tarragona to Castula, between Illicis and Carthage. Anton. Itin.

THIAUCOURT, in *Geography*, a town of France, in the department of the Meurthe; 7 miles W. of Pont-à-Mousson.

THIAUMA, in *Ancient Geography*, a town of Albania, between the rivers Cæsius and Gerrus.

THIBAUT VI., in *Biography*, count of Champagne and king of Navarre, deserves to be recorded as one of the earliest French song-writers. In 1254 he succeeded to the crown of Navarre on the death of his maternal uncle. Upon his return from the East, whither he went as one of the crusaders, he cultivated literature, and particularly poetry. He died at Pampelona in 1253, having acquired the somewhat inconsistent titles of the Great and the Song-maker. Under the latter character he obtained permanent reputation, degraded, however, by the occasional licentiousness of his imagery. He was the first, it is said, who blended masculine with feminine rhymes:—a capital invention in French versification. Moreri. Nouv. Dict. Hist.

The songs of this prince are placed by some at the head of those that have been preserved in the French language, as those by Guillaume IX., duke of Aquitaine, are in that of Provence. There were indeed songs written in both languages before these princes had done poetry the honour to make it their favourite amusement; but the chief part of those of higher antiquity than the time of these patriarchs of Provençal and French versification are either lost, or thought of little value.

This prince was contemporary with Philip Augustus, and Lewis VIII. and IX., which last prince he accompanied to the Holy War. It has been said by several historians that he was much captivated by the charms of queen Blanche of Castile, mother of St. Lewis, to whom many of his songs were addressed; but this point of history has been disputed with great zeal by M. l'Évêque de la Ravallière, editor of Thibault's poems, which he published in 1742, with notes, in 2 vols. 12mo. and a history of the revolutions, in the French language, from the time of Charlemagne to that of St. Lewis, together with an Essay on the Antiquity of French Songs. This learned prelate has defended the honour of queen Blanche with his pen, five hundred years after her decease, with as much prowess and true chivalry, as the most valiant champion of injured innocence could have done with his sword and lance, had he been animated by the presence of that princess, and the heroism of the times in which she lived.

“Les Grandes Chroniques de France” tell us that Thibault, at the age of thirty-five, having conceived a violent and hopeless passion for queen Blanche, was advised by wise and prudent counsellors to apply himself to music and poetry, which he did with such success, that he produced “the most beautiful songs and melodies that have ever been heard.” Fauchet Des Anciens Poetes François.

Two airs by Thibault may be seen in Burney's General History of Music, from the Vatican collection of Provençal songs in Gregorian notes, without bars or base; and given afterwards in modern notation, with a base, and an English version of the words.

THIBERVILLE, in *Geography*, a town of France, in the department of the Eure; 9 miles E. of Lisieux.

THIBET, or TIBET, pronounced *Tibbet* and *Tibt* in Bengal, and called by its own inhabitants *Puë*, or *Puë-koachim*, *puë* signifying *northern*, and *koachim*, *snow*, that is, the snowy region of the North, is a country of Asia, of which our knowledge, principally obtained at a very recent period, is still very imperfect. We have no evidence that the ancients ever penetrated the snowy mountains of Tibet. It seems to have been in some measure disclosed to the Portuguese, in their commercial intercourse with the East Indies; and the name of it was known to Marco Paolo and other travellers of the 12th and 13th centuries. Accordingly, Tibet seems to have been the southern part of their Tangut. Paolo indeed describes the province of “Tebeth,” as containing eight kingdoms, with many cities and villages, and as being a mountainous country, which produced some gold and spices, a large breed of dogs, and excellent falcons. But we have no geographical nor statistical account of this country upon which we can depend previously to the last century; and even now our knowledge of it is very partial and defective. About the year 1715, the emperor of China, as we learn from Du Halde, being desirous of obtaining a map of Tibet, sent two lamas, who had studied geometry, for this purpose. These lamas drew a map, from Sining, in the province of Shen-si, to the sources of the Ganges, which was afterwards examined by the Jesuits, and improved. This map is published in the Atlas of Du Halde, and has been followed, with few variations, by our modern geographers.

## THIBET.

Its authority is doubtful, its accuracy very suspicious, and the information it affords concerning kingdoms, states, and provinces, as well as particular places, very limited and unsatisfactory. According to our most recent maps, Tibet extends from about the 75th to the 101st degree of longitude, which, in the latitude of 30°, may be about 1350 geographical miles. The breadth may be regarded as extending from the 27th to the 35th degree of latitude, or about 480 geographical miles. It appears, however, from the testimonies of two intelligent travellers, Mr. Forster and Tiefenthaler, that the northern boundary of Tibet may be safely extended two degrees farther than it appears in our best maps, in which there is no portion of Great Tibet to the N.E. of Cashmir. Major Rennell moved it one degree farther to the north than D'Anville's boundary in lat. 34°, and Pinkerton thinks that he might safely have extended it at least 3°. The northern boundary of Tibet, according to the Russians, is Mus Tag, and they place that range in 38°. By adding 2° to 35°, we obtain an addition of 120 geographical miles to the number of 480 above stated.

Tibet, according to Mr. Bogle's account (Phil. Trans.) begins properly from the top of the great ridge of the Caucasus, and extends from thence in breadth to the confines of Great Tartary, and perhaps to the dominions of the Russian empire. He says, that having once attained the summit of the Bootan mountains, you do not descend in an equal proportion on the side of Tibet; but continuing still on a very elevated base, you traverse vallies which are wider and not so deep as the former, and mountains that are neither so steep, nor apparently so high. On the other hand, he represents it as the most bare and desolate country he ever saw; and the climate as extremely severe. According to Mr. Turner, the boundaries of Tibet and Bootan are separated by the lofty range of mountains called Soomoonang, and are marked by a long row of little inscribed flags, fixed in rude heaps of stones, and fluttering in the wind. These, at the same time, are supposed to operate as a charm over the Dewtas, or "genii loci," who are paramount here. No mountain is thought to be wholly exempt from their influence; and they range chiefly in the most elevated regions, where, drenched with dews, and worried with tempestuous weather, they are supposed to deal around them, in ill humour, their most baneful spells, to harass and annoy the traveller.

Tibet is sometimes divided into three parts, *viz.* Upper, Middle, and Lower. Upper Tibet comprises chiefly the province of Nagari, abounding with tremendous rocks and mountains, always covered with snow. The countries of Lata or Ladak (Latac) and Breguiong or Bramascion (perhaps Sirinagur) probably constitute a portion of Upper Tibet, as well as Nagari. Middle Tibet contains the provinces of Shang, Ou, and Kiang; and those of Lower Tibet are Takbo, Congbo, and Kahang. Many of these provinces are again subdivided: *e. g.* Nagari, which is considered as a kingdom consisting of three departments, Saughar, Pourang, and Tamo (Dam or Daum). Shang is on the W. bounded by Nipal. The province of Ou contains Lahassa or Lassa, the capital of Tibet. Kiang lies to the N. (or N.E.) of Ou, and is inhabited by a mixture of Tibetians and Monguls in tents. Kahang is on the S.E. bordering on the Birmans, and is divided into twelve departments. To these we must add the wide region of Amdoa, if it be not the same with Kahang, the natives of which speak the Chinese language. The country of Hor lies between Tartary and the provinces of Nagari and Kiang, and seems to be the Hohonor of our maps. Our *Bootan* (which fee) is called by the natives Decco or Takbo; and the countries W. of it, *viz.* Moringa or Morung, Mocampour, Nipal, Gorca,

and Kamaoon, are not considered as parts of Tibet. On the western side, high mountains, covered with perpetual snow, and terrible avalanches, have prevented the access and invasions of the Persians and the conquerors of Bucharia; while the deserts on the N.E. have proved ineffectual barriers against the Monguls and Eluts. Travellers have also been prevented from exploring this quarter by the western mountains, so that it is even now little known.

According to the topography, compiled from the papers of Pinnabilla, a Capuchin friar, who died in 1747, and was buried at Patan, by father Giorgi, in a work published at Rome in 1762, Tibet is bounded on the E. by China and Tarcenton, a province abounding with tea, and, since the year 1720, incorporated with the Chinese empire; on the S. by Bengal, Lotenke, Altibary, Mon, Brukpa, Lhoba, Lhokhaptra, Sciapado, and Bha; on the W. by Cashmir, Nepkal, and Moronga; and on the N. by Great Tartary, the Usbeks, Cashur, and Jonkar, as far as Jerkend and Cokonor or Kokonor. The kingdoms and provinces in this topography are enumerated by Pinkerton, *ubi infra*.

The government of Tibet has been considered as ecclesiastical or spiritual; though the lamas were accustomed to appoint a "tipa," or secular regent, a right which has been probably transferred to the Chinese emperor. This officer resides at Lassa the capital, and he is invested with the government and supreme controul over the whole country. Mr. Turner, however, is of opinion, that the temporal authority of the lamas may again recover its former dignity and splendour. Bootan, which is generally considered as a feudatory province of Tibet, has a raja or prince called Daab, of no very permanent or extensive authority. The laws must, like the religion, bear some affinity to those of the Hindoos.

The lama of Tibet was the Prester John of the middle ages, if he were not some Nestorian khan; and the appellation was unaccountably transferred by Portuguese ignorance to the emperor of Abyssinia. (See PRESTER JOHN.) In the time of Marco Paolo, Tibet, having been ravaged by the Monguls, was almost desolate. For some time this country had been subject to secular kings, called Tfan Pa; and the lama resided at Lassa, with a power resembling that of the spiritual prince of Japan. According to Giorgi, the succession of kings and lamas commences about 1340 years B.C. but about 1100 years after Christ the Chinese emperor gave to a celebrated lama the regal power. Those Monguls, called Eluts, conquered the secular prince, and transferred the whole power to the lama. (See Du Halde, iv. 50.) In 1792, the Nipalese, having committed great ravages in Tibet, the Chinese emperor sent an army to protect the lama; in consequence of which the Chinese established military posts on the frontiers, so that the intercourse between their country and Bengal is now precluded. The revenues of the lama and of the secular princes are trifling; nor is it likely that Tibet can ever aspire to any political importance.

Some have said, that the religion of Tibet is a corrupted Christianity; and even father Disiderii, a Jesuit, who visited the country about the beginning of the last century, thinks he can resolve all their mysteries into ours; and he asserts that they have a good notion of the Trinity, since, in their addresses to the Deity, they say as often koneiok-oik in the plural, as koneiok in the singular, and with their rofaries pronounce these words, Om, Ha, Hum. Of these whimsical conjectures we shall say no more, but pass on to observe, that the religion of the Tibetians seems to have derived its origin, says Turner, (*ubi infra*) from a disciple of Budh, who first broached the doctrine which now prevails over the wide extent of Tartary. It is reported to have received its earliest admission

admission in that part of Tibet bordering upon India, (which from hence became the seat of the sovereign lamas,) to have traversed over Mantchew Tartary, and to have been ultimately diffminated over China and Japan. Though it differs from the Hindoo in many of its outward forms, yet it still bears a very close affinity with the religion of Brahma in many important particulars. The principal idol in the temples of Tibet is Mahamoonie, the Budha of Bengal, who is worshipped under these and various other epithets throughout the great extent of Tartary, and among all the nations to the eastward of the Berhampooter. In the wide extended space over which this faith prevails, the same object of veneration is acknowledged under numerous titles; among others, he is styled Godama or Gowtama, in Assam and Ava; Samana, in Siam; Amida Buth, in Japan; Fohi, in China; Budha and Shakamuna, in Bengal and Hindooistan; Dherma Raja and Mahamoonie, in Bootan and Tibet. Durga and Kali; Ganeish, the emblem of wisdom; and Cartikeah, with his numerous heads and arms, as well as many other deities of the Hindoo mythology, have also a place in their assemblage of gods.

The same places of popular esteem or religious resort, are equally respected in Tibet and in Bengal; Praag, Cashi, Durgeedin, Saugor, and Jagarnaut, are objects of devout pilgrimage; and loads of the sacred water taken from the Ganges, have been seen travelling over these mountains, (which, by the bye, contribute largely to its increase,) upon the shoulders of men, whom enthusiasts have deemed it worth their while to hire at a considerable expence for so pious a purpose.

As far as can be judged respecting their ritual or ceremonial worship, it differs materially from the Hindoo. The Tibetians assemble in chapels, and unite together in prodigious numbers, to perform their religious service, which they chant in alternate recitative and chorus, accompanied by an extensive band of loud and powerful instruments. So that, whenever these congregations were heard, they forcibly recalled to remembrance, both the solemnity and sound of the Roman Catholic mass.

The instruments made use of were all of an enormous size. Trumpets above six feet long; drums stretched over a copper cauldron, such as are termed *norbut* in Hindooistan; the gong, a circular Chinese instrument of thin hammered bell-metal, capable of producing a surprising sound; cymbals, hautboys; and a double drum, shallow, but of great circumference, mounted upon a tall, slender pedestal, which the performer turns with great facility, striking either side with a long curved iron, as the piece requires a higher or a lower tone: these, together with the human tibia, and sea-conch, a large species of the buccinum, compose, for the most part, their religious band. Harsh as these instruments, individually taken, might sound to a musical ear, yet when joined together in unison with the voices of two or three hundred boys and men, managed with varying modulation, from the lowest and softest cadence to the loudest swell, they produce to the ear an effect extremely grand.

Other musical instruments are in the hands of the people of Tibet.

Among the Tibetians, says Mr. Turner, all is system and order. The mind readily obeys the superiority it has been accustomed to acknowledge. A sovereign lama, immaculate, immortal, omnipresent, and omniscient, is placed at the summit of their fabric. He is esteemed the vicegerent of the only God, the mediator between mortals and the supreme. They view him only in the most amiable light, as perpetually absorbed in religious duty; and, when called to bestow attention on mortal beings, as employed only in the benign office of distributing comfort and consolation by his

bleffing, and in exercising the first of all attributes, forgiveness and mercy. He is also the centre of all civil government, which derives from his authority all its influence and power. At the same time that he is the soul which animates their whole system, a regular gradation, from the most venerated lama, through the whole order of Gylongs to the young novice, is observed with rigid severity.

The inferior gradations from the president of a monastery, who is always styled lama, in addition to the name of the station to which he belongs, are Gylong, Tohba, and Tuppa. See GYLONG, TESHOO-LOOMBOO, TOHBA, and TUPPA.

The nation is divided into two distinct and separate classes, those who carry on the business of the world, and those who hold intercourse with heaven. No interference of the laity ever interrupts the regulated duties of the clergy. The latter, by mutual compact, take charge of all their spiritual concerns; and the former, by their labours enrich and populate the state.

In Tibet there are two sects, distinguished by the appellations of Gylookpa and Shammar, but the external appearance, or dress of both, is similar, except the distinction in the colour of the cap; the Gylookpa having adopted yellow, the Shammar red; a circumstance which is strictly attended to, on all occasions of ceremony. Three lamas are placed at the head of each sect; Dalai lama, Teshoo lama, and Taranaut lama, preside over the Gylookpa, who have their residence at Pootalah, Teshoo-Loomboo, and Kharka. This sect prevails over the greatest part of Tibet, and a division of the same is said to be established in a province of the Decan, called Seurra or Serrora.

In like manner, three lamas also, lam' Rimbochay, lam' Sobroo Nawangnamghi, and lam' Ghassatoo, preside over the Shammar; these have their residence in Bootan, in separate monasteries, but, from the limited extent of that country, at no great distance from each other. The principal of the Shammar sect in Tibet is styled Gongfo Rimbochay, and has his residence at Sakia.

The Tibetians are actuated by an ardent spirit of devotion; and they attribute the merit of every thing great, or singularly beneficial, to the agency of some supernatural being. It is the custom in Tibet to preserve entire the mortal remains of their sovereign Lama only; every other corpse is either consumed by fire, or given to be the promiscuous food of beasts and birds of prey. As soon as life has left the body of the Lama, it is placed upright, sitting in an attitude of devotion, the legs being folded before him, with the instep reaching upon each thigh, and the soles of the feet turned upwards. It is the practice here to cover the bodies of men, found dead in the fields, with clods of earth, which the rains gradually dissolve and incorporate, forming the loose mass into a compact hillock. This always attracts the same respect, and passengers continue to add to the heap, long after all traces of the body are lost, and its existence forgotten. Thus also the piety of the Tibetians offers a similar rite to the bodies of those whom chance may have led to the spot, where the fragment lay at the instant of its fall, though the fatal effects of it may not have been certainly known.

A tribute of respect is paid, in this region, to the manes of the dead in various ways. The sovereign lamas are deposited entire, in shrines prepared for their remains, which ever after are looked upon as sacred, and visited with religious awe. The bodies of inferior lamas are usually burnt, and their ashes preserved with great care in little metallic idols, which have places assigned them in their sacred cabinets. Common subjects are treated with less ceremony;

mony;

## THIBET.

mony; some of them are carried to lofty eminences, where, after having been disjointed, and the limbs divided, they are left a prey for ravens, kites, and other carnivorous birds. Others, with less respect, are committed to the usual receptacle of the dead. The last, but less frequent, mode of disposing of the dead, is committing them to the waters of the river. Burial, that is, inhuming the corpse entire in the earth, is altogether unpractised.

On one side of the monastery of Teshoo-Loomboo is the place to which they convey their dead. It is a spacious area, inclosed on one part by a perpendicular rock, and on the others by lofty walls, raised probably with a view to exclude from public observation, the disgusting objects contained within them. At the top it was totally uncovered, so as to be perfectly open to the birds; and at the bottom a narrow passage was left through the walls, near their foundation, for the sole purpose of admitting dogs, or other beasts of prey. On the rock above, a platform overhung the inclosure, which had been constructed for the convenience of precipitating the dead bodies with greater ease over the walls, into the area. And here, the only rites performed, in honour of the dead, were merely such as tended to facilitate the destruction of the body by dogs or birds of prey. But though this was the general receptacle, yet there were some who declined the use of it, and conveyed their friends to the summit of some neighbouring hill, where they disjointed and mangled the dead body, that it might become a more easy prey to carnivorous birds. Hence it was concluded that there was a strong prejudice in their minds of some idea of pollution attached to "being given to the dogs," which was sufficient to create a preference of the contrary practice. In Tibet, as well as in Bengal, an annual festival is kept in honour of the dead.

The Tibetians are much addicted to superstition; and accordingly they lay great stress on lucky and unlucky days. They also pay great respect to the professors of astrology. Hence we find no prudent traveller ever attempting to undertake a journey, without previously appealing to this authority, and endeavouring to obtain an auspicious presage. The same signal of favour is deemed indispensably requisite in every important enterprise, and the same wary circumspection enters equally into all the more minute concerns of domestic life. The union of the sexes, and the giving names to infants, are neither of them events to be accomplished without a regular appeal to the same decisive oracle. This science is also regarded in the construction of their almanacs. Their year, which is lunar, consists of 12 months, each month having 29 days; and the days are reckoned from the appearance of the new moon, in regular succession, till it shews itself again. The parts of the days are, evening, night, morning, and noon: and their computation of time is conformable to the general practice of the East, by a cycle of 12 years. The art of printing is said to have been very anciently practised in Tibet; but it has hitherto been principally appropriated to sacred works, and to the service of learning and religion. Their books are printed with blocks of wood, on narrow slips of thin paper, fabricated from the fibrous root of a small shrub. The printed and written letters appropriated to works of learning and religion, are called "uchen;" and those of business and correspondence are called "umin." The Gyilongs, or priests, pass through a regular education. As for the language of Tibet, its origin is not satisfactorily ascertained. Du Halde reports, that it is the same with that spoken by the people of Sifan, on the frontiers of China; but as this province is sometimes included in Tibet, this information is vague and indeterminate. Their cha-

acters, says sir William Jones, are apparently Indian, but their language has now the disadvantage of being written with more letters than are ever pronounced; for, although it was anciently Sanscrit and polysyllabic, it seems at present, from the influence of Chinese manners, to consist of monosyllables, to form which, with some regard to grammatical derivation, it has become necessary to suppress, in common discourse, many letters which we see in their books; and thus we are enabled to trace in their writings a number of Sanscrit words and phrases, which, in their spoken dialect, are quite undistinguishable.

A singular custom prevails in this country, which may be called polyandry. One female associates her fate and fortune with all the brethren of a family, without any restriction of age or of numbers. The choice of a wife is the privilege of the elder brother; and it is said, that a Tibetan wife is as jealous of her connubial rites, though thus joined to a numerous party of husbands, as the despot of an Indian zennana is of the favours of his imprisoned fair. The business of propagating the species is abandoned to mere plebeians; and marriage seems to be considered rather as an odium and a burden. The influence of this custom on the manners of the people is not found to be unfavourable. Humanity and gentleness of disposition are the constant inheritance of a Tibetan. Mr. Turner says that he never saw these qualities possessed by any people in a more eminent degree. Without being servilely officious, they are always obliging; the higher ranks are unassuming; the inferior, respectful in their behaviour; nor are they at all deficient in attention to the female sex; but, as we find them moderate in all their passions in this respect, also their conduct is equally remote from rudeness and adulation. Comparatively with their southern neighbours, the women of Tibet enjoy an elevated station in society. To the privileges of unbounded liberty, the wife here adds the character of mistress of the family, and companion of her husbands. The company of all, indeed, she is not at all times entitled to expect. Different pursuits, either agricultural employments or mercantile speculations, may occasionally cause the temporary absence of each; yet whatever be the result, the profit of the labourer flows into the common store; and when he returns, whatever may have been his fortune, he is secure of a grateful welcome to a social home. The men are generally stout, having in a degree the Tataric features, and the women are of a ruddy brown complexion, heightened like the fruits by the proximity of the sun, while the mountain breezes bestow health and vigour.

The ceremonies of marriage are neither tedious nor intricate in Tibet. Their courtships are carried on with little art, and quickly brought to a conclusion. The elder brother of a family, to whom the choice belongs, when enamoured of a damsel, makes his proposal to the parents. If his suit is approved, and the offer accepted, the parents, with their daughter, repair to the suitor's house, where the male and female acquaintance of both parties meet and carouse for the space of three days, with music, dancing, and every kind of festivity. At the expiration of this time the marriage is complete.

Tibet is thinly scattered with inhabitants, on account of its mountainous surface and the severity of its climate; nor can any accurate estimate be made of its population. From some circumstances it has been conjectured, that upon the whole it cannot be less than half a million. Giorgi, indeed, or rather Pinnabilla, from whom he deduces his statement, computes the number of inhabitants in 1730 at 33 millions, and the soldiers at 690,000; but both these numbers are most extravagantly exaggerated; for Tibet has  
been

been often conquered by the Chinese with armies not exceeding 40,000 men. The singular custom of polyandry, already mentioned, seems adapted to check the progress of population, the superabundance of which, in an infertile country like Tibet, would be one of the greatest calamities, as it must produce eternal warfare or internal want.

Bootan and Tibet exhibit a very remarkable contrast in their external appearance. Bootan presents to the view nothing but the most mis-shapen irregularities; mountains covered with eternal verdure, and rich with abundant forests of large and lofty trees. Almost every favourable aspect of them, coated with the smallest quantity of soil, is cleared and adapted to cultivation, by being shelved into horizontal beds: not a slope or narrow slip of land between the ridges lies unimproved. There is scarcely a mountain, whose base is not washed by some rapid torrent, and many of the loftiest bear populous villages, amidst orchards and other plantations, on their summits and on their sides. It combines in its extent the most extravagant traits of rude nature and laborious art.

Tibet, on the other hand, strikes a traveller, at first sight, as one of the least favoured countries under heaven, and appears to be in a great measure incapable of culture. It exhibits only low rocky hills, without any visible vegetation, or extensive arid plains, both of the most stern and stubborn aspect, promising full as little as they produce. Its climate is cold and bleak in the extreme, from the severe effects of which the inhabitants are obliged to seek refuge in sheltered valleys and hollows, or amidst the warmest aspects of the rocks. Yet perhaps Providence, in its impartial distribution of blessings, has bestowed on each country a tolerably equal share. The advantages that one possesses in fertility, and in the richness of its forests and its fruits, are amply counterbalanced in the other by its multitudinous flocks and invaluable mines. As one seems to possess the pabulum of vegetable, in the other we find a superabundance of animal, life. The variety and quantity of wild fowl, game, and beasts of prey, flocks, droves, and herds in Tibet, are astonishing. In Bootan, except domestic creatures, nothing of the sort is seen. It has been asserted that Tibet was, in remote times, almost totally inundated; and the removal of the waters that covered its surface is ascribed to the miraculous interposition of some object of their worship, whose chief temple is reported to be at Dungeedin, Gya. In this traditionary belief we may possibly discover some traces of the universal deluge; though the tradition be obscured by fable and disfigured by a mixture of absurdity. In the temperature of the seasons in Tibet, a remarkable uniformity prevails, as well as in their periodical duration and return. The same division of them takes place here, as in the more southern region of Bengal. The spring is marked from March to May, by a variable atmosphere; heat, thunder-storms, and occasionally with refreshing showers. From June to September is the season of humidity, when heavy and continued rains fill the rivers to their brim, which run off from hence with rapidity, to assist in inundating Bengal. From October to March, a clear and uniform sky succeeds, seldom obscured either by fogs or clouds. For three months of this season, a degree of cold is felt, far greater perhaps than is known to prevail in Europe. Its extreme severity is more particularly confined to the southern boundary of Tibet, near that elevated range of mountains which divides it from Assam, Bootan, and Nipal. The summits of these are covered all the year with snow, and their vicinity is remarkable, at all seasons, for the dryness of the winds. The range is confined between the twenty-sixth and

twenty-seventh degrees of northern latitude. During the winter, a practice is adopted in the neighbourhood of these mountains, similar to that in use in the coldest parts of North America, but in some respects more complete. It is that of preparing meat and fish for carriage, by the action of extreme cold. This practice, however, seems to be confined to the preservation of mutton alone, which is a very simple process, and requiring no use of salt. The Tibetians generally use that which is recently killed in a raw state, without any previous cookery.

Among the valuable and useful animals of Tibet, which are musk-deer, horses of a small size, goats yielding the hair that is manufactured into shawls, and cattle that are diminutive, to which we may refer the yak of the Tartars, their breed of sheep claims a distinguished rank. Of these the flocks are numerous, and upon them they chiefly depend for their winter food. A peculiar species, thought to be indigenous to this climate, is marked almost invariably by black heads and legs. Their size is small, their wool is soft, and their flesh, says Mr. Turner, is the finest mutton in the world. The wool affords material for one of their principal manufactures. (See IJHANSJA-JEUNG.) Their skins and those of the lambs are cured with the wool on, and constitute a valuable article for winter garments, and for foreign traffic.

The soil and climate of Tibet are very unfavourable to any kind of exertion and activity that have for their object the cultivation of the land, but from time immemorial it has been the resort of merchants. Commerce, however, has been very languidly encouraged. The form of government, which is arbitrary, is inimical to industry and enterprise. In Tibet, and also in Bootan, the first member of the state is the chief merchant; and his station and power of controul give him great advantages over the common adventurer; and of course by this monopoly of the sovereign, emulation is restrained and suppressed.

Although, as we have said, the nature of the soil prohibits agriculture; yet the vales on the approach of winter being laid under water, they are ploughed and sown in spring, and the crops are matured by frequent showers and a powerful sun. The autumn being clear and tranquil, the harvest is long left to dry on the ground; and when sufficiently hardened is trod out by cattle. The course of cultivation is wheat, peas, and barley; rice being confined to a more southern soil. Nevertheless, the country abounds with commodities, which in different circumstances would give spirit and extent to commercial transactions, whilst they are languishing in sloth, or exhibiting every indication of poverty. The trade with Bengal was formerly not inconsiderable; but this has been interrupted and diminished by the commotions which have long distracted the kingdom of Nipal, which was the only known channel of communication. Bengal transmitted to Tibet, broad cloth, chiefly of inferior quality, and of yellow and scarlet colours; some few trinkets, such as snuff-boxes, smelling-bottles, knives, scissars, and optic-glasses; and spices, particularly cloves and nutmegs; sandal wood, pearls, emeralds, sapphires, lapis lazuli, coral, jet, amber, shells, cloths, leather, tobacco, indigo, and otter-skins; and it received from Tibet, gold-dust, musk, and tincal. The articles of trade next in importance, amongst the natural productions of Tibet, are goats' hair and rock-salt. Bootan, Nipal, Bengal, and Hindoostan, are supplied with tincal from Tibet. The hair of the goats is carried to Cashmere, where it is manufactured into shawls. The demand for salt is in the consumption of Nipal and Bootan.

The trade from Tibet to Bootan consists of gold-dust, tea,

tea, woollen cloths, and salt; from Bootan to Tibet, the articles are English broad cloth, Rungpore leather, tobacco, coarse cotton cloths, &c. paper, rice, sandal wood, indigo. Tibet sends to Luddauk, the mart between Cashmere and Teshoo-Loomboo, the fine hair of goats, and receives in return gamboge, shawls, dried fruits, as apricots, raisins, currants, dates, almonds, and saffron. Khumbauk sends to Tibet, horses, dromedaries, and Balgar hides. In Tibet there are several mines of lead; and as lead-ore contains silver, it might be separated from it to great advantage, if the method of doing it were known. Here are also mines of cinnabar, which contains a great proportion of mercury, if the Tibetians knew how to extract it. The copper-mines furnish materials for the manufacture of idols, and all the ornaments disposed about monasteries, on which gilding is bestowed, for which there is a great demand in Tibet.

A very small quantity of specie is current in Tibet, and that is of a base standard. It is the silver coin of Nipal, here denominated *indermillee*, and worth about one-third of a sicca rupee; and it is cut into halves, third parts, and quarters. In all mercantile transactions, however, the equivalent is made in bullion, *i. e.* talents of gold and silver, valued in proportion to the purity and specific gravity of the metal.

The commerce between Tibet and China is carried on principally at a garrison town, on the western frontier of China, named Sining, or Silling: thither merchants resort from Tibet with their manufacture; *viz.* a thin cloth resembling frieze, but rather of a more open texture, gold-dust, and some other commodities procured from Bengal; which they exchange for tea, silver bullion, brocades, and fruit. In these articles an extensive trade is carried on; and Mr. Turner has been assured that, on the territory of Teshoo-Loomboo alone, tea, to the amount of five or six lacs of rupees, is annually consumed. From hence, too, Bootan is supplied with tea, which is in the same general use there.

Tibet exports to China, gold-dust, diamonds, pearls, coral, musk, woollen cloths of its own manufacture, lamb-skins and otter-skins, called *ood*, brought from Bengal; and China returns to Tibet, gold and silver brocades, plain silks, satins, black teas of four or five different sorts, tobacco, silver bullion, quicksilver, cinnabar, china ware, trumpets, cymbals, and other musical instruments; furs, *viz.* sable, ermine, black fox; and dried fruits of various sorts.

The regulations for carrying the commerce of the English East India Company through the dominions of Bootan, by means of the agency of native merchants, were settled by the treaty entered into by Mr. Bogle, in the year 1775.

The cities and towns of Tibet are little known: the capital is *Lassa*; which see. Among the edifices, the monasteries occupy the first class. (See TESHOO-LOOMBOO.) The chief river of Tibet is *Berhampooter*; which see. The Hoan-ho and Kian-ku of the Chinese also derive their origin from the eastern boundaries of Tibet. The great Japanese river of Cambodia, or Maykaung of Laos, that of Nou Kia, supposed to pass near Martaban, into the gulf of Pegu, and the Irawaddy of the east country, are supposed to have their sources from the mountains of Tibet, which may be styled the Alps of Asia. Another large river, called the Sardjoo or Gagra, which, after a course of about 600 miles, nearly parallel on the E. with that of the Ganges, joins it near Chupra, and derives its spring from the lofty western mountains of Tibet. In these Alpine regions are many lakes, such as *Terkiri*, and *Jamdro* or *Pelté*; which see. The ranges of Tibetan mountains in the W. and S. seem to bend in the form of a crescent, from the sources of the Ganges to the frontiers of Afam, in a N.W. and S.E. direc-

tion. To the N. of Sanpoo a parallel and higher ridge seems to extend, the northern extremities abounding with large frozen lakes. The chief elevation of mountains appears to be central, S. of the lake *Terkiri*, and is called *Koiran*, the western part being denominated *Kantel*. The southern range presents many names of distinct mountains, comprehended under the Hindoo name of *Himmela*. From these ranges many branches extend N. and S. This country possesses many mineral waters, the salutary use of which is not unknown to the natives. Among its natural curiosities we may reckon a singular rock, N. of *Tassifudon*, described by Mr. Saunders in the Appendix to Turner's Travels, and forming in front six or seven angular semi-pillars of large circumference, and some one hundred feet in height. This natural curiosity is partly detached from the mountains, and projects over a considerable fall of water, which heightens the picturesque appearance of the whole. The rock is laminated, and might be formed into slate; and as iron-stones are found in the vicinity, these pillars probably, like those of basalt, arise from the influence of that metal. Phil. Trans. vol. lxxvii. Sir W. Jones's Works, vol. iii. Turner's Travels. Pinkerton's Geography.

TIBET or TIBET, *Little*, a district N.W. of Cashmere, which is supposed to contain the chief source of the Indus. The situation of this country is doubtful; it probably lies on the N. and N.W. of Cashmere, and is divided from Great Tibet by a high mountainous ridge, and by a higher chain, that of *Belur*, from Great Bucharua. It is described as a very mountainous and poor country, pervaded by the Indus, and towards the N. full of forests. The capital is *Afcardu*, and further to the N. is *Schekar*. *Temir-kand*, or the fortrefs of iron, seems to command the pass between Great and Little Tibet; and the two Ganges of the Chinese maps (supposed sources of the Ganges) are probably rivers which join the Indus from the East. Pinkerton.

The delineation of the country of the *Sacæ*, by Ptolemy and Strabo, (see *SACÆ*;) will be found to correspond, says Hugh Murray, esq. in his "Ancient Geography of Central and Eastern Asia," in every respect, with that given by Mr. Elphinstone of the Plain of Pamera and Little Thibet. It was bounded on the S. by Hindooftan, from which it was separated by the ridge of Imaus. On the N. it was bounded by the next parallel chain, "*Mons Ascataneas*," which cannot possibly be any other than the *Mooz-Taugh*, to whose name, indeed, it bears a rude resemblance. It extended E. from the *Montes Comedorun*, (the *Beloor* or *Belur*;) to somewhat beyond the head of the Ganges; precisely the dimensions of Little Thibet. Great and Little Thibet form a table land of extraordinary elevation, bordering on Hindooftan to the S.; and two parallel chains, running from E. to W., prop this mighty bulwark of Asia. The northern barrier is formed by an immense chain, known under the name of *Hindoo Coosh*, and *Himmela* or *Himalaya*, which forms the northern limit of India. The whole extent of it is covered, to a great depth, with perpetual snow; and every measurement yet made, from *Peshaur* to *Nepaul*, has made it exceed 20,000 feet above the level of the plain, being higher than the highest peaks of the Andes. The whole is recognized by Ptolemy under the name of *Imaus*. The northern range, known by the uncouth appellation of *Mooz-Taugh*, *taugh* being merely the generic name of mountain, or *Karrakorum*, Mr. H. Murray apprehends to be described by him under the name of *Mons Ascataneas*. Its absolute elevation seems to exceed that of *Himalaya*, and yet from the high level of its base, it does not present so formidable an aspect. At right angles

angles to both, connecting them, and shutting in the western side of the table land, is another chain, called the Beloor-Taugh; forming the eastern limit of Shognaun, the ancient Sogdiana, and thus coinciding with the Montes Comedorun. According to the writer now cited, the "Scythia extra Imaum" of Ptolemy must be Great Thibet, with an extent of Tartary stretching indefinitely northwards. After Scythia, he says, comes the famous Serica; and if Great Thibet be Scythia extra Imaum, the next great country must be China, which he concludes from a variety of circumstances to be Serica. This writer thinks Pinkerton's hypothesis, mentioned under SERICA, of its being Little Bucharia, altogether inadmissible. See Murray's Ancient Geography of Central and Eastern Asia.

**THICKET**, a close knot or tuft of trees; a close wood, &c. in any field or inclosure of any kind.

**THICKETS**, in *Gardening*, a sort of close plantations of trees and shrubs, in pleasure-grounds, parks, &c. They are designed for different purposes, as sometimes to repel the force of tempestuous and cold cutting winds, either from the habitation, or some particular part of the garden; or to form places of shade and retirement in summer, having spaces for walks, recesses, &c. under the umbrage of the trees, and occasionally to conceal from view any unsightly or disagreeable object, and also sometimes to form a screen or blind arranged towards some outward boundary.

They are sometimes planted wholly of the large tree kinds, five or six to eight or ten feet asunder, some in regular lines, like a close grove, or more generally in a sort of promiscuous planting, but with some degree of order in the distances: they are also often composed of various trees and shrubs together, to effect a more full, close growth below and above, and to display a greater diversity in the plantation, by disposing the various shrubs properly between the larger trees, in some order of gradation, the lowest towards the front, and the taller growths backward, so as to form a sort of close underwood thicket below, while the trees run up and form a thicketty growth above; and sometimes they are formed wholly of shrubs of different sorts and degrees of growth, from the lowest placed forward, to the tallest behind.

They are sometimes, too, formed wholly of particular sorts of trees disposed separately in distinct plantations, as of elm, ash, beech, poplar, alder, willow, &c.

The planting of thicket plantations should be effected with young trees of from four, five, or six, to eight or ten feet growth, and the shrub kinds proportionally; in all of which the planting may be performed in the common seasons of autumn, winter, and spring.

In the culture of thicket plantations, little is required but that of keeping them clear from large overbearing weeds, while the trees and shrubs are in young small growth.

Thickets are now much less in use than was formerly the case in ornamental gardening, and pleasure-ground planting; they may, however, on some occasions, be introduced with good effect.

**THICKON**, in *Geography*, a river of Pennsylvania, which runs into the Delaware, N. lat.  $40^{\circ} 25'$ . W. long.  $75^{\circ} 8'$ .

**THICKSTUFF**, a name for sided timber exceeding four inches in thickness, but not being more than twelve inches in thickness.

**THIEBLEMONT**, in *Geography*, a town of France, in the department of the Marne; 8 miles E.S.E. of Vitry le Français.

**THIEL**, or **TIEL**, a city or town of Holland, in the department of Guelderland, situated on the north side of the Wahal, in a small island called *Tieler-Weert*. In one of its fauxbourgs, called *Santwayck*, which is well fortified, is a

strong citadel: the fortifications were destroyed in the year 1674, by the French, who had made themselves masters of the place about two years before, and have been since repaired. In the year 1528, it was besieged by the Spaniards, when Charles V. was at war with the duke of Gueldres; but they were compelled to raise the siege, through the brave resistance of the citizens. The country about it is marshy, and the air reckoned unwholesome. The fortifications are destroyed; 18 miles N.N.E. of Bois-le-Duc.

**THIELLE**, a town of the county of Neufchâtel, between the lake of Biemme and the lake of Neufchâtel; 5 miles N.E. of Neufchâtel.—Also, a river of Switzerland, which rises in the Vaudois, passes through the lakes of Neufchâtel and Biemme, and runs into the Aar, 3 miles below Buren.

**THIELLEN**, a town of Switzerland, in the canton of Uri; 2 miles N.W. of Altorff.

**THIELT**, a town of France, in the department of the Lys; 10 miles N. of Courtray.

**THIENE**, a town of Italy, in the Vicentin; 9 miles N.W. of Vicenza.

**THIERS**, JOHN BAPTIST, in *Biography*, a divine, was born at Chartres about the year 1636, and became a bachelor of the Sorbonne, professor in the college of Du Pleffis at Paris, and curé of Chauprend, in the diocese of Chartres. Being arrested in consequence of a dispute with the clergy of Chartres, and a satire against one of them, he escaped by a stratagem, and found refuge with the bishop of Mans, who gave him the cure of Vibraie, where he died in February, 1703. His works are numerous, freely written, and on singular subjects; but we refer for an account of them to Moreri, the Nouv. Dict. Histor. and Gen. Biog.

**THIERS**, in *Geography*, a town of France, and principal place of a district, in the department of the Puy-de-Dôme; here are manufactures of cutlery, playing-cards, paper, thread, &c.; 21 miles S.E. of Gannat. N. lat.  $45^{\circ} 52'$ . E. long.  $3^{\circ} 38'$ .

**THIERSHEIM**, a town of Germany, in the principality of Culmbach; 6 miles N.E. of Wunsiedel.

**THIERSTEIN**, a town of Germany, in the principality of Culmbach, on the Eger; 5 miles N.E. of Wunsiedel.

**THIE-WEY-ARA-YETH LAKE**, a lake of North America. N. lat.  $61^{\circ} 20'$ . W. long.  $106^{\circ} 30'$ .

**THIGH**, **FEMUR**, a part of the body of men, quadrupeds, and birds, between the leg and the trunk. See **EXTREMITIES**.

We have an account in the Philosophical Transactions of a large piece of a young man's thigh-bone being taken out, and the place so well supplied by a callus, that he walked straight. See N<sup>o</sup> 461. sect. 2.

**THIGH-Bone**, *Fractured*. See **FRACTURE**.

**THIGH**, *Luxation of*. See **LUXATION**.

**THIGH**, in the *Manege*. The effect of the horseman's thigh is one of the aids that serves to make a horse work vigorously. See **AID**.

Fore-thigh, or arm of a horse, is that part of the fore-leg that runs between the shoulder and the knee: though the fore-thigh does not bend or bow, yet we commonly say, a horse goes fine, that bends well the fore-thigh, importing by it, that he bends well his leg.

Horses should always be full and well made in the thick parts of the thigh, especially in horses of the working kinds.

**THIGHT**, in *Agriculture*, a term provincially applied to turnip, or other crops which are thick or closely set. It also signifies impervious, when applied to roofs or vessels in some districts.

**THILACHIUM**, in *Botany*, so named by Loureiro, from

from *θύλακος*, a little bag, alluding to the form of the calyx. It ought rather therefore to have been *Thylachium*.—Loureir. Cochinch. 342.—Class and order, *Polyandria Monogynia*. Nat. Ord. *Capparides*, Juss.

Gen. Ch. *Cal.* Perianth inferior, oblong-turbinate, ribbed, pointed, undivided, close, at length bursting all round. *Cor.* none. *Stam.* Filaments numerous, about seventy, awl-shaped, long, erect, inserted into the receptacle; anthers oblong, upright. *Pist.* Germen superior, on a stalk the length of the filaments, oblong, striated; style noae; stigma roundish. *Peric.* Berry oblong, with ten sides, of one cell. *Seeds* numerous, kidney-shaped, imbedded in pulp.

Ess. Ch. Calyx of one leaf, oblong, bursting all round. Corolla none. Berry stalked, with ten angles, one cell, and many seeds.

1. *Th. africanum*. African Pouch-flower.—Observed by Loureiro on the eastern coast of Africa, near Mozambique, where it is called by the Portuguese *Manguero*. The tree is small, with spreading branches. Leaves alternate, stalked, ovate, entire, smooth. Stalks terminal, bearing several flowers, whose long stamens are of a saffron colour. The author observes that this genus approaches *Capparis*, in its stamens and the stalk of its berry, but differs widely in the unusual form of the calyx, as well as the want of a corolla, and the figure of the seed-vessel. De Theis thinks it allied to *MARCGRAVIA*, see that article. As far as it is related to *Capparis*, he is right; but between the corolla of *Marcgravia*, and the calyx of *Thilachium*, which he seems to have had in view, there can be no affinity; any more than between the latter and the pouch in the outer calyx of *RUYSCHIA*, which article the reader may likewise consult. We must be content to leave the matter as we find it, there being great probability, considering how little we know of the botany of its native country, that the plant, and even its genus, are entirely new to Europeans.

**THILAY**, in *Geography*, a town of France, in the department of the Ardennes; 7 miles N.N.E. of Charleville.

**THILCHATEL**, a town of France, in the department of the Cote d'Or; 14 miles N. of Dijon.

**THILCO**, or rather **T'HILCO**, in *Botany*. See **FUSCHIA**, n. 9.

**THILL**, in *Rural Economy*, the name of the framed shafts of carts and waggons, between which the horse draws and moves. The thills of these kinds of carriages should always, as much as possible, be made of tough ash-wood, and light in proportion to the nature and uses of them.

**THILL-HORSE**, the last horse in a team, or the horse that goes between the thills or shafts; which often sustains much undue weight and pressure on the back, in consequence of the load which is drawn. This is capable of being relieved in various ways and by different contrivances, but the two which are noticed below would seem to be the most simple and easy. It is well known to be almost universally the practice to hook or attach the second horses, in cart or waggon teams, on at the end of the shafts. The consequence of which is obviously this: whenever the cart or carriage ascends a hill, and the fore part of the team comes to level ground, which not unfrequently happens, while the thill-horse or horses are still on the declivity, from their force being exerted in a right line to the ends of the shafts, all the powers of the whole of the leading horses must, in such cases, inevitably load and oppress the thill-horse or horses, when so directed, as they tend to depress the shafts, in their exertion to draw at the proper point of draught; that is, in the line with the axle. The thill-horse or horses are often seen, in such instances, nearly borne

down, where the ascents are steep, and the levels rather suddenly regained. The back, or backs, of such horses become a sort of fulcrum, on which the strength of all the preceding horses acts as a kind of lever; which, if sufficiently forcible, and the thill-horse or horses' backs were strong enough to bear the pressure, must lift the carriage off the ground, until it should come to a level with the line of their pull.

In order to remedy this great pressure and inconvenience, it is advised that a looped iron, of about a foot in depth, in the whole, be fastened to the end of the shaft; nailing and rivetting it firmly, by means of expanded flats. The looped part will then reach about eight or nine inches under or below the shafts. Each trace is to be carried through these loops instead of hooking on there, and be fastened at the bottom of the shaft, near to where it hitches on to the frame of the carriage. This will give play to the traces, and wholly relieve the thill-horse or horses from the undue pressure to which they are exposed.

The principle here laid down is necessary, whatever other method may be had recourse to in removing the inconvenience.

At Hinton-House, in Berkshire, S. Nicolls, esq. is said to effect this in a somewhat different manner, the aim of which is the prevention of the draught of the trace-horses pulling down the thill-horse or thiller, which is always found to be the case, when they draw from a *drail*, as it is termed, in the fore part of the shaft, if the thill-horse be taller than the trace-horses, or if the latter are going down a declivity, before the former has passed its summit, as seen above.

The preventive practice or mode in this case is by inserting a chain to the hinder part of the shafts, which is also attached, and confined in some measure, to the fore part of the shaft (where the drail is generally placed) by a piece of chain, which allows it to move freely to a certain distance from the shaft, in order that the draught may be constantly kept in a horizontal direction.

**THILYPTERIS**, in *Botany*, a term used by Dillenius to express the common female fern or brakes.

**THIMA**, in *Geography*. See **TIMA**.

**THIMBLE**, a cover for the finger, made of brass, steel, or silver, and used by all people who sew, as tailors, milliners, &c.

**THIMBLE**, in *Sea Language*, an iron ring with a groove round the outside, to receive the rope it is spliced into. Thimbles are spliced into the rigging and sails for blocks to be hooked to, or ropes to reeve through where blocks would appear too heavy.

**THIMBLE ISLANDS**, in *Geography*, small islands near the coast of Connecticut. N. lat. 41° 11'. W. long. 72° 42'.

**THIMBRIC-KEUY**, a village of Asiatic Turkey, in the province of Natolia, on the site of an ancient town called "Thymbra," built by Dardanus, king of Phrygia. Here are some considerable ruins, supposed of a temple of Apollo.

**THIMDA**, a town of Tunis; 8 miles S.W. of Bizerta.

**THIMIO**, in the *Materia Medica*, a name used by some authors for a peculiar sort of lignum aloes, which is blackish and very heavy, and extremely sweet.

**THIN**, a name given by the Arabian writers to earth of any kind.

Thus the bole armenic of Galen is called by Avicenna *thin Armeni*; and hence the word *mutthin*, an adjective signifying earthy, or approaching to the nature of earth; a term applied to many medicines of this kind.

**THINA**, in *Botany*, a name by which some authors have called the *larix*, or larch-tree.

THINGAU, in *Geography*. See TINGÆ.

THINGVALLA, a place of Iceland, about 26 miles distant from Reikiavik, and 24 miles from Skalholt; in which is a small, mean, and dirty church. The scenery about it is romantic; but the want of wood, and the effects of subterraneous heat, combine to give it a dreary aspect. The adjoining lake of the same name is a fine sheet of water, reckoned to be about ten miles long and from three to seven in breadth. In the lakes are two pretty large islands, called Sanday and Nefey, composed entirely of volcanic matter. The depth of the lake is said to be very great; a line of 100 fathoms having been sunk without reaching the bottom. It receives the waters of the surrounding bogs, and near it in different places vapours are seen to ascend from hot springs. It abounds with trout. At the S. end the mountains are very picturesque, and the ascending vapours contribute to the solemnity of the whole scene, as they arise from springs that have been produced by the most dreadful commotions, and the destruction of a country that may once have been beautiful and fertile. Near Thingvalla is a building, where the courts of justice were formerly held; but as Reikiavik is now the seat of government, the courts are held there. It does not appear why this place was originally selected for the seat of justice; but a town being once established, and trade carried on freely, and to a greater extent than in former times, ready recourse to the law became necessary. Although not more than fifteen years have elapsed (1817) since the judicial courts were transferred to Reikiavik, few remains are left to mark a spot so famous in the history of Iceland. The only building is a small wooden house, in which the consultations were held and sentence pronounced by the instantment or governor. The magistrates and people assembled on the occasion lived in tents. The culprits who were condemned to die were beheaded on a small island in the river Oxeran, which here flows into the lake. The females were drowned in a deep pool below the lava, a little farther up the valley. An ecclesiastical court used to be held at Thingvalla by the bishop of Skalholt, attended by the provosts and two ministers from each Syssel. It is suggested, that Tingwall in Shetland, and Dingwall in Ross-shire, are evidently the same names as Thingvalla; and were probably, in ancient times, places where justice was administered. Towards the N. are several ranges of mountains, which, from the account received, and the appearances observed, are volcanic. Among these, the principal seems to be Skalbreydè, a lofty Jokul, of which description of mountains others were seen at a distance. Although the transference of the superior court from Thingvalla to Reikiavik has, probably, been attended with advantage, the Icelanders, as a people, have some reasons for regarding this change with regret. The annual meeting at Thingvalla was not merely that of a tribunal of justice, but an assembly of the nation; and though the importance of this assembly was diminished, and its dignity degraded, by the subjection of the island to a foreign power, yet on the spot where the greatest among his ancestors so often stood, the mind of the Icclander must ever have been awake to enthusiasm and patriotic pride. "Hic sacra, hic genus, hic majorum multa vestigia!" Mackenzie's Iceland.

THINKING, COGITATION, a general name for any act or operation of the mind.

Chauvin, with the Cartesians, will have thinking to consist in a certain native, inherent motion or agitation of the human mind, of which itself is conscious.—*Native* and *inherent*, since he conceives it no other than the very essence of the mind itself, or, at least, its principal and fundamental property: an *agitation*, since there is a new modification or

change made in the mind, which we scarcely know how to conceive without motion; add, that the origin and etymology of the word *cogitation*, according to Varro and Festus, implies as much; *cogito* being used for *coagito*.

When the mind turns its view inwards, upon itself, the first idea that offers, says Mr. Locke, is thinking; in which it observes a great variety of modifications, and of them frames to itself distinct ideas: thus the perception annexed to any impression on the body, made by an external object, is called *sensation*.

When an idea recurs without the presence of the object, it is called *remembrance*.

When sought after by the mind, and brought again into view, it is called *recollection*.

When held there long under attentive consideration, it is called *contemplation*.

When ideas float in the mind without regard or reflection, it is called a *revery*; when they are taken express notice of, and, as it were, registered in the memory, it is *attention*; and when the mind fixes its view on any one idea, and considers it on all sides, it is *study* and *attention*.

These are the most obvious modes of thinking; but there are several others which we know of; and, doubtless, the mind is capable of infinite others, of which we have no notion at all.

The school-philosophers usually divide thinking, with regard to the object it is employed about, into understanding, *intellectio*; and willing, *volitio*.

And hence, these are said to be the two powers or faculties of the human mind.

*Intellectual* thinking is farther subdivided into divers kinds; the first, when the mind merely apprehends or takes notice of a thing, called *perception*; the second, when it affirms or denies a thing, called *judgment*; the third, when it gathers or infers a thing from others given, called *reasoning*; the fourth, when the mind disposes its own thoughts or ideas in order, called *method*.

*Volitive* thinking, or volition, admits of infinite different modifications, or new determinations.

Some authors extend the idea of thinking farther; and consider it in God, angels, brutes, &c. whence results a new division of thinking, into divine, angelical, human, and animal or sensitive.

But the two first we know little or nothing of: the third is that of which we have already been treating.—As to the last, *viz.* animal or sensitive thought, it is defined to be, an action of the soul attending to an external object, affected by means of the animal spirits duly agitated in the brain, to excite an idea.

The Cartesians maintain, that thinking is essential to the human soul; and, consequently, that there is no time when the soul does not think: but this doctrine has been very vigorously attacked by Mr. Locke; who labours to shew, that in sleep, without dreaming, there is an entire cessation of the modes of thinking.

*I think, cogito*, according to Des Cartes, is the first, and most certain, of all truths; from which, alone, we draw this consequence, *therefore I am*, or exist, *sum*.—One might also say, *cogito, ergo Deus est*; *I think, therefore there is a God*.—Logic is defined, the art of thinking methodically.

THINNING of Plantations and Woods, in *Agriculture*.

The practice of thinning plantations of trees and woods, so as to let the plants of them have more room as they advance in growth, is mostly an operation of considerable importance; as upon it, perhaps, more than upon any other point of the after-management in such cases, depends the nature, quantity,

tity, and modification of the timber which is raised and produced.

Woods of the natural kinds, the seeds of which are sown by birds or the winds on soils and surfaces of very different descriptions and sorts, rise and spring up at different times, and of very different degrees of thickness, strength, and vigour in themselves and their different parts; consequently it is easy to suppose, that those which are placed in favourable situations and circumstances, will quickly overtop the others; and if they do not wholly destroy, will at least weaken them in such a way as not to be affected or inconvenienced by them, until the strongest trees ultimately find ample and sufficient room for their growth. In this way, although nature may be slow in her operations, she effects her purpose in a very complete manner. Besides these observations, Mr. Loudon has noticed that artificial thinning is only assisting nature; and that hence even leaving natural woods to be thinned by time, would not be economical.

It is suggested with regard to artificial plantations, that in these the soil is equally cultivated, and the plants are put into the ground much about the same size, and at the same time, and that hence they of course rush up together all nearly of the same height, producing neither ornament nor timber; and none being produced so strong as to take the lead and destroy the rest, they grow in this manner until they are so crowded as to exclude air and moisture. At which period, unless assistance has been previously given by thinning, the whole of the plantation dies together, and is destroyed.

Where thinning is necessary in old natural woods, or such as have been planted, it should constantly be performed by degrees in a regular manner, well considering the state, qualities, and habits of the trees, as well as the nature of the soil on which they grow, the situation and exposure in which they are placed, and other similar matters. The outsidings of them should commonly be less thinned than the other parts, and the trees on the richer parts of the land be more thinned than those on the other descriptions of it. The thinning of the side shoots and branches of the trees should likewise, in some measure, accompany the other thinning, and be performed in a suitable manner to their natures, states, and purposes for which they are intended.

It is, however, mostly the custom to begin to thin them out at about seven years from the time of planting them, or that of their first growing up, and to repeat it every seven years afterwards. When the planting has been performed in the proportion of from six to eight hundred trees to the acre, they may be made to stand, in the first thinning, at about one tree to each rod of ground, or nine trees to eight rods. But in the second thinning, a rather larger proportion of trees should be taken out, as rather more than one to each rod; and in the third thinning, the proportion may be made still in a larger ratio, so as to leave the trees about a rod square each. Much must, however, always depend upon the nature, situation, and circumstances of the particular plantations and woods.

In all these thinnings the worst trees should be removed, so as to leave the straightest and best plants to stand for timber or other purposes.

It is suggested, that as in most plantations the fir tribe of trees has been introduced either for the purpose of ornament or shelter; where thinning is practised, in such cases, too large a proportion of these firs are mostly left. Hence, from their comparatively quick growth, it is concluded that such plantations have a disagreeable sameness through-

out; and that, as most of them are made in the same manner, this appearance extends itself over the whole country.

The plantations in which thinnings in the way of ornament is most particularly required, are those which are designed for groves. In many woods and copes no plants require to be taken out but the nurse ones, where any such have been planted. Plantations of the fir kind, Mr. Loudon advises to be thinned somewhat gradually, beginning the work after they have been five or six years planted, and continuing it for ten or twelve years: after which time, thinning, he thinks, becomes pernicious. And that the trees which are to be thinned out should constantly be grubbed up by the roots; for that when these are suffered to remain, they check the progress of the trees which are left. But these sorts of plantations are sometimes, and very properly, left altogether without thinning, being cut down wholly as a crop when fifteen or twenty years old, or of about that standing. This is conceived to be in general the most profitable mode of planting and after-management on thin, bare soils in the vicinity of mines and pits, where wood of this sort is greatly in demand by the proprietors for the support of the upper strata. Where some of the fir tribe have been planted as nurseries, they are recommended to be thinned out in a gradual manner, by being grubbed up as they begin to injure and inconvenience the principal trees. And groves, where the trees are of the deciduous kinds, should be thinned out after the same manner; only, the work in these cases may proceed until the trees have arrived at nearly their full growths.

Woods, where under-growth is always the object intended when they are properly planted, require, as has been seen above, no sort of thinning, unless in cases where nurseries have been planted, or when the timber-trees are too much crowded by the low growths; the whole should be suffered to grow for twelve, fourteen, or more years, or until the under-growth is in a suitable state to be cut over; when at that period the strongest trees should be fixed upon, and left as standards in a properly thin state. As copse-woods usually grow a certain length of time in proportion to their natures and kinds, and are then wholly cut over by the surface of the ground; they, of course, demand less thinning than others, or none at all, except when nurseries have been planted among them; and in the case of both woods and copes, these, as they are thinned out, should constantly be replaced by the principal trees at suitable distances.

In all cases where ornament is in any way considered, the above writer thinks the trees or copse left in thinning should not be equidistant from each other, but in groups of irregular thickness; and it is supposed that the same may be had recourse to even in woods where utility is the chief consideration; as it will make no material difference in the produce of timber, and is so much more natural. See PLANTATION and PLANTING. See also TIMBER and WOOD.

THINNING out Crops, the practice of thinning out such plants among them as are too thickly or closely placed together, as in the case of turnips or other similar crops. In the different sorts of turnips, the thinnings may be made in such a manner as that the plants may stand ultimately at the distance of from seven or eight to nine or ten inches every way from each other, in proportion as the land is more poor or rich in its quality. But in carrot crops, the thinning them out to the distance of about eight or twelve inches, according to the richness of the soil, may probably be the most proper practice. And the same will mostly be the case for those of the parsnip and beet kinds.

Where cabbage, borecole, or other similar crops, are sown,

sown, they should always be thinned out to the distance of a foot and a half, two feet or more, as the soil may be of a less or more rich quality. And lettuces, when put in by sowing, should be thinned to the distance of from eight to twelve inches, according to the nature of the soil.

The thinning out of any other sorts of field-crops of these kinds must also be performed according to their natures and particular habits of growth.

Some of these sorts of crops are best thinned out in a gradual manner, as the turnip, carrot, beet, &c.; while in others it may be done all at once, as for the cabbage, and some other kinds.

There are several different methods practised in accomplishing this business, as by means of the hand simply, the use of the hand-hoe of different suitable sizes, according to the states and circumstances of the crops, and lately in the row kinds, by an implement invented for the purpose. This last is by much the cheapest and most expeditious manner of performing the work; if it should be found, on further trial, to be equally accurate and effectual in the execution of the business. This sort of tool or machinery was invented and constructed on the farm of Charles Gibson, esq. at Quarmer Park, near Lancaster, and a representation of it is given in the Corrected Agricultural Survey of that county, lately published. See *THINNING and Hoeing Machine for Turnips, &c.*

The other modes of effecting and completing this kind of work, are a great deal more troublesome, laborious, and expensive than the above, especially the first of them, as many hands and much time are required for doing it in the most proper and effectual manner by such means. Where the hand-hoe is employed, two or three different sized hoes are mostly made use of for the purpose in the different successive thinning hoeings, which, when in the hands of experienced workmen, do the business in a pretty quick, easy, and complete manner, as the supernumerary plants are struck and cut out with much exactness and regularity. It is constantly necessary in such cases to keep the hoes in a pretty sharp state, in order to perform the work well, and with neatness. The principal objections to doing this sort of labour by the hand, are its tediousness, and the treading which takes place during the operation.

*THINNING out Plants, in Gardening*, the pulling or drawing out such as are too close and thick in some crops of the general and other kinds, as well as in some other cases, so as that the remaining ones may stand at proper and suitable distances for producing the most favourable crops, plants, or other productions. This is mostly practised in the cases of the main crops of onion, carrots, parsnips, beets, spinach, and several other similar kinds, which are sown in the broadcast manner; in different small seed crops, for raising plants to be afterwards set out, such, for instance, as the cauliflower, brocoli, cabbage, borecole, lettuce, endive, and many others; and in the producing and bringing forward young tree plants of most sorts in nursery grounds and other places.

Onion crops are, for the most part, thinned out at different times, as the demands of the markets, or in other ways may be, so as to leave the remaining plants at the distances of four or five inches or more from each other, according to their nature, kinds, and other circumstances; always, however, allowing sufficient room for their full and complete growths. Much advantage is often made in this way by the young onions which are thinned out, which would otherwise be lost and thrown away.

The carrot, parsnip, and beet crops are commonly thinned

out at one or two thinnings, the standing plants being left at the distances of about six or eight inches apart, as the nature of the soil and crops may be. The young plants of the carrot kind, thus drawn, are in some cases bunched and made use of, especially when the crops are late in being thinned out, which should always be avoided as much as possible.

Lettuce and spinach crops may be thinned out at once to the distances of six, eight, or more inches between the plants, in the different kinds, as the nature of them may be, when put in upon the broadcast plan. The thinnings are of little use or value, except for waste purposes, such as being thrown to the hogs, &c. in these instances. Most other similar sorts of crops may be thinned out in the same manner.

The small seed crops of the different kinds should constantly be kept so thinned out as to prevent the plants of them from being drawn up in a weak manner, and unfit for being set out; as where the contrary is the case, there is always great waste, and the plants seldom succeed so well. They should be gradually thinned out by planting, as well as in other ways.

Young tree plants, in most cases, require frequently thinning out in their early growths, in order to raise and bring them forward in the best and most perfect manner. They should therefore, in general, be so kept thinned out as never to want sufficient room for rising in the manner which is the most natural and proper for them, and for preventing the injury they may sustain by standing too close in the rows or otherways.

Due, early, and proper thinning out of crops and plants, is of course a matter of considerable importance and utility in the garden culture of different sorts of vegetables, trees, and other productions of the same kinds.

*THINNING and Hoeing Machine for Turnips*, that sort of implement or machine which is contrived for the purpose of thinning or setting out this as well as other similar kinds of crops that stand in rows. It is made light, and constructed somewhat in the form of the plough, having a suitable apparatus so attached to it behind as to be put in motion, and strike out the supernumerary plants as the horse proceeds regularly along the intervals of the ridges. The horse is driven by the person who holds and directs the tool while at work. It is capable of going over a very considerable space of ground in a short time, and if found, on the result of further trials, to perform the work with due accuracy and correctness, will be a very great acquisition to the drill turnip husbandry, and for different other purposes of the same nature.

**THIONVILLE**, in *Geography*, a town of France, and principal place of a district, in the department of the Moselle. The place contains 5014, and the canton 13,988 inhabitants, on a territory of 175 kilometres, in 27 communes; formerly belonging to the duchy of Luxemburg, and ceded to France by the treaty of the Pyrenées in 1659. N. lat. 49° 21'. E. long. 6° 15'.

**THIORSAA**, a large turbid river of Iceland, on the road from Skalholt to mount Hetla, the course of which is nearly from N.E. to S.W. In its passage over rugged masses of lava rising abruptly from its bed, this river dashes among the rocks, and forms impetuous rapids and falls.

**THIR**, in *Chronology*, the name of the fifth month of the Ethiopians, which corresponds, according to Ludolf, to the month of January.

**THIRD, TERTIUS**. See **NUMBER** and **NUMERATION**.

**THIRD**, in *Music*. The 3d is the most agreeable and necessary

necessary concord in counterpoint, throughout the whole system of practical harmony.

There are two kinds of thirds; the major or sharp 3d, which is four semitones or half notes above the base; and the minor or flat 3d, which is three.

Very agreeable music in two parts may be composed, and often is composed, of thirds only. The 3d is wanted with every other concord, and even discord, except the 4th, when it is used as such with the 2d instead of the 9th.

Dr. Pepusch, in his "Treatise on Harmony," has given curious and ample instructions for the use of thirds in composition.

It would be a curious inquiry, why a 3d was regarded by the ancients as a discord; and why it is called by the moderns an imperfect concord. We cannot afford space for long disquisitions on every subject of vain and frivolous curiosity, among which this would probably be numbered. But it seems as if the ancients estimated the perfection of consonances by the simplicity of ratios in the division of the monochord; regarding the octave as the most perfect concord next to the unison, as it was produced by a simple division of a string into halves, expressed by

The next in perfection was the 5th, produced by a third part of a string

After this, the 4th, which was reckoned by the ancients not only a concord, but a perfect concord, expressed by the ratio of

A fourth part of a string gives the 15th, or double octave

The fifth part of a string produces the major 3d to the 15th, which, though in the organ the stop called the tierce, it is a major 17th to the diapason: its ratio is expressed by

The minor 3d is expressed by

The major 6th, composed of four tones and a semitone major, as  $\frac{E}{G}$ : its ratio is

The minor 6th, composed of three tones and two major semitones, as  $\frac{C}{E}$ : its ratio is

The extreme sharp, or, as the French call it, the superfluous 6th, composed of four tones, a semitone major, and a semitone minor, as  $\frac{G^{\#}}{Bb}$ : the ratio of this 6th is

We believe that the triple progression of a series of perfect 5ths made the major 3ds so extremely harsh, that no natural good ear could admit them among the concords. And in the first attempts at counterpoint, it was a long time before a 3d was admitted in *discant*, in which *diatessaronare* and *quintoier*, or a diatonic series of 4ths and 5ths, now prohibited, was preferred to 3ds and 6ths in succession.

THIRD Borough, in our *Ancient Law-Books*, denotes a constable.

THIRD Earing, in *Husbandry*, the tilling or ploughing of the ground a third time.

THIRD Estate. See ESTATE, COMMONS, &c.

THIRD Night-awn-hynd. By the laws of Edward the Confessor, a guest, who had lain three nights in an inn, was reputed a domestic, and his host was answerable for what offence he should commit.

For one night he was accounted *uncub*; for two nights, *guest*; and the third, *awn-hynd*, or *hogen-hyne*. "Prima nocte incognitus, secunda hospes, tertia domesticus censetur."

THIRD Order, a sort of religious order, that observes the

same rule, and the same manner of life, in proportion as some other two orders instituted before.

The third orders are not originally religious orders, but associations of secular, and even married persons, who conform, as far as their condition will allow them, to the design, intention, and rules of a religious order, which associates and directs them.

The Præmonstrantes, Carmelites, Augustines, and Franciscans, dispute among themselves the honour of having first introduced third orders; but the pretensions of the last appear to be the best founded.

The first contend, that the third order of Præmonstrantes began in the life-time of their founder St. Norbert, who died in 1134.

F. Diego de Coria Maldonado, a Spanish Carmelite, who has a particular treatise on the third order of Carmelites, derives them immediately, as well as the Carmelites themselves, from the prophet Elijah.

The third order of Augustines, if we credit F. Bruno, was instituted by St. Augustine himself; but the arguments he produces are so frivolous, that F. Helyot observes, they are not worth refuting.

The third order of Franciscans was instituted by St. Francis in 1221, in favour of people of both sexes; who being smitten with the preachings of that saint, demanded of him an easy manner of living a Christian life; upon which he gave them a rule, the constitutions of which are not now extant, as written by himself, but only as reduced and confirmed by pope Nicholas IV. sixty-eight years afterwards.

Those of the first order of this saint are the monks called *Minor Friars*, comprehending the Cordeliers, Capuchins, and Recollects; the second comprehends the nuns of St. Clare; and the third, several persons of both sexes, who live at liberty; and these are what we call the *third order*. See FRANCISCANS, &c.

Of this order, which was only established for secular persons, several of both sexes, to attain the greater perfection, have afterwards commenced religious, and formed various congregations, under various names; as "Religious Penitents of the Third Order," &c.

THIRD Point, or *Tierce-point*, in *Architecture*, the point of section in the vertex of an equilateral triangle.

Arches or vaults of the third point, called by the Italians *diterzo acuto*, are those consisting of two arcs of a circle meeting in an angle at top. See ARCH.

THIRD Point, in *Perspective*. See POINT.

THIRD Rate. See RATE.

THIRD Subsidy Duty. See DUTY.

THIRD Sound, in *Music*. See TERZO Suono, TARTINI, and STILLINGFLEET.

THIRD Year, *Title of the*. See TITHE.

THIRDENDALE, a liquid measure used at Salisbury, containing three pints.

THIRDINGS, the third year of the corn or grain growing on the ground at the tenant's death, due to the lord for an heriot, within the manor of Turfat, in Herefordshire.

THIRLAGE, or *Thirlage to Mills*, in *Rural Economy*, a contract or power authorized by law, to prevent the tenants of certain districts from carrying their corn to be ground any where else than at a particular mill. It was a practice which formerly prevailed much; and it was too often used as an engine of oppression, that proved extremely galling to those who were obliged to submit to it, but which at present is nearly, if not wholly done away, except in certain places.

The account of the origin and nature of this oppressive practice,

## THIRLAGE.

practice, which has been given by the author of the original Agricultural Survey of East Lothian, in the latter district of country, may not be uninteresting to the curious inquirer. It is conceived that there, in former times, corn was reduced into meal, as in ancient Rome, by a hand-mill, which was called a *quern*; and which was used in the remote parts of the Highlands of Scotland long after the year 1745.

It is certain, however, that the water machine called the mill, for the grinding of oats into meal, is of high antiquity in the same country; and as it was introduced before the period of record, it may be fairly said "caput inter nubilia condit." But from the ancient name of one of the duties, *knave'ship*, which will be afterwards explained, the mill would seem to be of Saxon original.

It seems also natural, that a person who possessed a stream of water upon his estate, should be invited by his neighbours to be at the expence of erecting a mill upon this stream; and that they, on the other hand, should *thirle*, that is, restrict and bind their lands, in all time coming, to use and frequent this mill with their corns, and to pay a certain proportion of the meal according to the universal mode then practised of paying in kind for the grinding of it.

Anciently, it is contended, there is reason to believe, the mills were at first erected upon ecclesiastical lands, and belonged to the clergy.

It is stated, that there are three different species of this sort of servitude known and acknowledged in the law of the above country; but of these, two only belong properly to rural economy; however, in order more thoroughly to understand the subject, the whole may be shortly explained.

It is noticed, that the first and the lightest species of thirlage, is called the *thirlage of grindable grain*, and it means that the tenants and possessors of the restricted lands (in the law of the above country the *servient tenement*) shall be obliged to resort to the mill (the *dominant tenement*) to which these lands have been restricted, with all the oats and barley they shall use for food, and there pay certain dues for the grinding of them.

The second, and the oppressive thirlage, is, it is said, called the *thirlage of growing corn*. By this covenant of thirlage, it is stated, that every ounce of corn produced upon the servient lands, let the quantity be ever so great, must be brought to the dominant mill, and there manufactured into meal, and the covenanted or accustomed duties paid.

It is suggested, that the only limitation that this severe thirlage admitted of, was in favour of feed and of horse corn.

Sometimes a special covenant was made, by which the possessors of the servient lands paid what was called *dry multure*; that is, they paid a quantity of corn to purchase the freedom of going to market with the remainder in the same state; and where constant immemorial usage has sanctioned this custom, the courts of law generally, it is said, have so far mitigated the severity of this species of thirlage, as to find, that the proprietor of the dominant mill can demand no more than that quantity of *dry multure*, which the immemorial usage has established. Such decisions are asserted to be grounded upon the principle of a presumed contract, of which the record or memory has been lost betwixt these parties, whereby the one agreed to pay, and the other to receive, the commutation fixed by the usage.

The third and last species of thirlage is, it is observed, called the *thirlage of invecta et illata*, and belongs properly to *urban* tenements: the meaning of it is, that corn, wherever produced, if brought for consumption within the boundaries of the dominant mill, must be carried to the mill and manufactured there, and pay the accustomed duties.

It is stated that this species of thirlage existed in most of the boroughs of the above country; and that the mill generally belongs to the incorporation, where the borough holds directly of the crown, or what are called royal boroughs. But where a borough holds of a subject superior (the lord of the manor), the mill generally belongs to the superior, and the accustomed duties are paid to him, or to his tenant in the mill.

It is to be observed, the writer says, that in all these thirlages, it was the land of the servient tenement that was bound; and that although it should pass by purchase through twenty different hands, every purchaser, and all his people upon these lands, were equally bound to frequent the dominant mill.

It is further noticed, that there were also three different species of duties paid at the dominant mill; as, first, the *multure* (*multura*, grinding); secondly, the *bannock* (loaf); and, thirdly, the *knave'ship*.

It is remarked, that the first of these duties belonged to the heritor and proprietor of the mill; and seems evidently to have been the fine or *premium*, originally settled, as the inducement for his being at the expence of erecting the mill, and for supporting the machinery of it in future. The *bannock* was the duty paid to the miller; and the *knave'ship* the duty paid to the under servants in the mill.

It is stated, that the quantity of meal paid under the name of multure, varied considerably in different counties, and even at different mills. It has been known as high as the eleventh boll, and sometimes as low as the twenty-second boll; and in one particular instance so small as the thirty-second: but it may be taken, on the average, at nearly the seventeenth boll.

The other duties were also various; but they may, it is supposed, be taken jointly as equal to the half, or from that to three-fourths of the multure.

But wholly independent of these several duties, the possessors of the servient tenement were, it is said, bound to perform certain personal services to the mill and its appendages: for instance, when the dam-dyke, or the rampart that directs the stream of water from the river to the mill wanted repair, or when the aqueducts to and from the mill required to be scoured, the people of the servient tenement must turn out and perform these works. When the roof of the house in which the mill stood decayed, they must find thatch for making that repair, and they must put it on. When grind-stones were wanted, or an axle, or any other part of the machinery that required a heavy carriage, they must go with their horses and carriage to the nearest place (whatever might be the distance) to bring these articles to the mill.

But this species of thirlage, it is believed, never was known in the above country; or that at least, if it was, it has long since been forgot. Besides, it is noticed, that there was another circumstance peculiarly fortunate, which put it in the power of most of the landed proprietors of that county, without difficulty, to emancipate their tenants from the thirlage even of *grindable grain*, namely, that the landlord almost universally was proprietor both of the dominant and servient tenement; and that as he restricted his tenants to his own mill by a covenant in the lease, progressively as the leases of the mills expired, the landlords in general emancipated their tenants from every species of thirlage, at a conversion of twenty shillings *per plough*, which was paid by the tenant; and he and his servants were left at perfect freedom to resort to any mill, where they could get their work best done, and at the lowest rate.

The case, however, it is remarked, was widely different

in many parts of the north of the above country; and it is known, from what has already been mentioned, that there were many estates, or *servient tenements*, belonging to one proprietor, which were allotted to mills, or the *dominant tenements*, belonging to another proprietor, and that not a few of these thirlages were the severe one of *growing corns*.

The writer does not think it here necessary to inquire whether these mills were originally erected by the clergy, and since the reformation in religion, have passed into the hands of laymen; or whether, perhaps, if mills are truly of Saxon origin, they were generally, and at once introduced into the above country, when under the Saxons, who certainly were, it is thought, a more enlightened people than the Scottish and Pictish inhabitants of the North, whose ignorance, of course, may have led them more generally to subject themselves in the servitude of thirlage, to invite their clergy, or a few of the more wealthy among them, to undertake the arduous task of erecting mills.

From the near analogy betwixt tithes and thirlage, it has appeared to the writer a matter of just surprize, that the parliament of the above country, which, in the course of a preceding century, first authorised the valuing of tithes for the purpose of fixing a *modus* of payment, and afterwards compelled the lay titulars (proprietors) to sell their tithes at nine, and in some cases at six years' purchase, to the proprietors of the lands, did not introduce a fixed *modus* for thirlage, which certainly operated like tithes, as a tax upon industry, to bar, or at least to retard agricultural improvement in its progress. See *TITHES*.

*THIRLBY, STYAN, LL.D.* in *Biography*, a learned critic, was born about the year 1692 at Leicester, and finished his education at Jesus college, Cambridge, blending promising talents with self-conceit, litigiousness of temper, and a habit of intemperance. He appeared at an early age as a writer of controversial pamphlets, and thus acquiring some degree of reputation, obtained the fellowship of his college at the age of about 21 years. In maturer life he probably applied to study with greater diligence, for his edition of Justin Martyr, to which he was indebted for literary reputation, was published in 1722. Versatile in his disposition, he diverted his attention at this time from divinity to physic, and accepted the post of librarian to the duke of Chandos. In this station he continued for a short time, and being under a necessity of quitting it, he became first a student in civil law, and afterwards in common law. Weary of these pursuits, he resided in the house of his former pupil, sir Edward Walpole, by whose interest he obtained a sinecure place in the port of London, of the value of about 100*l.* a-year. Upon leaving this asylum, he took private lodgings; but continued to indulge his habit of sitting and intoxication. He is said to have contributed some notes to Theobald's edition of Shakspeare; but his self-indulgence and indolence rendered him unfit for mental exertion, and he closed his career in December 1753. His edition of Justin Martyr, censured by some, but regarded upon the whole as a valuable performance, contains Justin's two apologies, and his dialogue with Tryphon the Jew, Greek and Latin, with notes and emendations by the editor, and select notes by former editors. Nichols's *Lit. Anecd. Gen. Biog.*

*THIRLWAL CASTLE*, in *Geography*, a boundary fortress between England and Scotland, on the Picts' Wall; 3 miles N.W. of Haltwefel.

*THIRON de Gardais*, a town of France, in the department of the Eure and Loire, 21 miles S.W. of Chartres.

*THIRSK*, or *THRUSK*, a borough and market-town in the wapentake of Birdforth, North Riding of the county of York, England; is 23 miles N.W. by N. from the city of York, and 223 miles N.N.W. from London. It is situated in a plain, nearly surrounded by hills, on the banks of a rivulet called Cod-beck, which divides the town into two parts, respectively named the Old Town and the New, which are connected by two small stone bridges. The two towns are distinct, as far as relates to the election of members; but in all other respects are considered as one. The civil government is vested in a bailiff, annually chosen by the burgage holders. The New Town stands within the precincts of the ancient castle of the Mowbrays. In the centre of the town is the market-place; which would be one of the finest in the county, were it not for the tolbooth and shambles, now in a ruinous condition. The market is held on Mondays, and is well supplied with all kinds of provisions. Five fairs are held annually for horned cattle, sheep, leather, and woollen cloth. These fairs attract a considerable number of dealers, and, with the advantage of the great North road from York, are very beneficial to the town, and in some degree supply the want of manufactures, of which here are only a small quantity of coarse linens and facking, and a few bridles and saddles. The population, as returned to parliament in the year 1811, consisted of 2155 persons, occupying 549 houses. The parish church stands on a rising ground at the northern extremity of the town. The roof, which is elliptical, and of oak, ornamented with carving, is supported by a double row of pillars and pointed arches. In the south wall of the chancel, near the altar, are three ornamented stone seats. The church is generally supposed to have been built out of the ruins of the ancient castle, which was demolished in the reign of Henry II. A moat and rampart are still to be seen, but no vestige of the building remains; and in Camden's time, it was nearly in the same state. It had once, however, been a place of great strength, when held by the potent Mowbray family. It was here that Roger de Mowbray began his rebellion against Henry II. and joined the king of Scotland against his own sovereign. The revolt was suppressed, and the castle of Thirsk, as well as several others belonging to the rebellious lords, were by the king's order destroyed. Besides the parish church, the Calvinists, the Quakers, and the Methodists, have their respective meeting-houses. Here is also a School of Industry for poor girls, who are clothed and taught reading, writing, and arithmetic, plain work, knitting, &c.

That division of the town called *Old Thirsk*, is a borough by prescription, and returns two members to parliament. The right of election is in the occupiers of burgage tenements, now only fifty in number, of which forty-nine are the property of sir Thomas Frankland, bart. Old Thirsk consists of a range of cottages on each side of the turnpike road leading from York to Stockton, and of two squares surrounded by the same kind of buildings. In one of these squares, called St. James's Green, the cattle fairs are held; the other is the site of an ancient church, of which, time has long since swept away every vestige. In the latter of these squares is an elm-tree of venerable antiquity, from which the place takes its name, Hawm (that is Elm) Green; and under the shade of whose branches the members of parliament are elected. One of the chief inconveniences of Thirsk and the adjacent country, is the scarcity and high price of coal, which is brought from the county of Durham in small carts, containing from eighteen to twenty-two bushels, varying in price according to the season.

In the vicinity of the town is Byland abbey, which was

founded in the year 1177, by Roger de Mowbray, when a stately monastery and church were erected, and dedicated to the Virgin Mary. This abbey continued to flourish till the general dissolution in 1540, when the site and most of the demesnes were granted to sir William Pickering. At present, the ruins and site belong to the honourable family of Stapylton.

Near the base of the Hambleton hills, within four miles of Thirsk, is Thirkleby-Hall, the seat of sir Thomas Frankland, bart. The walks and pleasure-grounds are extensive and well laid out; and the house is an elegant modern structure.—*Beauties of England and Wales*, vol. xvi. Yorkshire; by J. Bigland.

**THIRST**, a painful sensation, occasioned by a vellication of the nerves of the throat or fauces, and producing a desire of drinking. See **DIGESTION**.

Thirst may be sometimes eluded by rolling a clean bullet or a pebble in the mouth, which occasions an extraordinary issue of saliva to moisten the throat, &c.

Mr. Boyle mentions a man who could easily abstain from drinking for nine days, and yet have his diet nothing more liquid than usual; the secretions of urine, sweat, &c. being performed all the while regularly, and in the same quantity as usual.

In dropsical cases, where there is not a right secretion of the urine by the renal glands, and the vessels and parts of the body are loaded with too great a quantity of serous humours, a great moderation in drink might be attended with good success, provided some liquor could be found out to allay that uneasy sensation. Probably this would be best performed by mucilages acidulated with spirit of vitriol or sulphur, or jellies with juice of lemon, &c. and that a small quantity of such a composition, now and then used, might be of as much real service, in quenching thirst, as draughts of liquors, which increase the symptoms.

In feverish disorders, the patient is frequently tormented with a violent thirst, which is moderated by acidulating the barley-water, or sage-tea, with spirit of vitriol, or with lemon-juice: but by nothing so much, as allowing the patient some slices of an orange. Pringle, *Observ. on Diseases of the Army*, p. 135.

**THIRSTY SOUND**, in *Geography*, an inlet or bay on the N.E. coast of New Holland, so called by Cook in 1770, because it afforded no fresh water. It lies in S. lat. 22° 10', and W. long. 210° 18'; and may be known by a group of small islands lying under the shore, from two to five leagues distant, in the direction of N.W., and by another group of islands that lie right before it, between three and four leagues out at sea. In this inlet is good anchorage in 7, 6, 5, and 4 fathom; and here are places very convenient for laying a ship down, where, at spring-tides, the water does not rise less than 16 or 18 feet. The N.W. point of Thirsty Sound was called "Pier-Head."

**THIRTEEN ISLANDS**, a cluster of islands in the Pacific ocean, among the New Carolinas, so named by Capt. Wilson. N. lat. of the most southerly 7° 16'. E. long. 144° 30'.

**THISATON**, a river of Canada, which runs into lake Huron, N. lat. 46°. W. long. 84°.

**THISMA**, a name used by some for any subterranean vein, or bed of a mineral.

**THISTLE**, in *Agriculture*, a well-known prickly troublesome weed, common in corn and other fields. It has been observed, that wherever thistles grow naturally, it is a sure sign that the land is strong, and of a tolerable good quality; but that they are at the same time a great annoyance to every plant intended to be cultivated. And it has

also been well remarked, that there are no weed-plants over which the economical farmer ought to keep a more watchful eye than the thistle tribe, as they are not only wholly useless, but occupy much ground, and being furnished with downy seeds, are capable of being multiplied and carried almost to any distance. Besides, they do much mischief by impeding the work both in handling hay and corn crops. It is of course a matter of much consequence to be well acquainted with the qualities of each kind, in order to enable the farmer to judge with certainty how far and by what means their destruction may be effected in the most certain and ready manner.

There are a great many sorts of thistles; and those which chiefly deserve the attention of the farmer, are the *annual*, *biennial*, and *perennial* kinds.

There are four of these plants belonging to the first division or sort, namely, the *musk-thistle*, which grows to the height of two or three feet; the heads hang down, and the flowers smell somewhat like musk. It is frequently found occupying whole fields, particularly where the lands are of a chalky or barren quality; and sending forth flowers in July and the following month in great abundance. The *milk-thistle*, which is found plentiful in most waste places, and upon old banks, being well known by its beautiful large leaves, which are variegated with white spots and veins, as if they had been sprinkled with milk. The flowering season of this plant is in August, or thereabouts. The *wetted* or *curled* thistle, which is frequently met with on banks, and by road-sides, but seldom intruding itself into fields or pastures. Its time of flowering is June and the following month. See **CARDUS**.

And the *common fork-thistle*, which is a very troublesome weed in fields and gardens; it is found in some situations that the plant is smooth, but in others that it is rough, being prickly on the margins and mid-ribs of the leaves, and also on the peduncles and calyces of the flowers, and the stems or stalks abound with a lactescent or milky juice. See **SONCHUS**.

But in the second division, or biennial kind, there are not more than three, as the *spear* or *bull-thistle*, which rises about three or four feet in height, the extremity of each leaf running out into a long sharp point, remarkably prickly: hence, in some places it is called by the name of the bull-thistle. It has large heads of flowers, and commonly grows by the sides of roads, near dunghills, and not unfrequently in fields and pastures, flowering in June and the following month: the *marsh-thistle*, which grows very tall and prickly, having numerous heads of flowers, small and of a red colour, growing abundantly in wet meadows and in woods, flowering in July and the month which succeeds it. See **CARDUS**.

And the *cotton-thistle*, which is found plentifully in uncultivated places in many parts. The roots are long and fibrous, and send forth several oblong sharp-pointed whitish-green sinuated leaves, covered with a cottony down, and set with spines on their edges. In the middle of these shoots up a stalk, to the height of five or six feet, divided towards the top into diverse branches, set with leaves at their joints, and having jagged, leafy borders running along them, edged with spines, as has the main stalk also. Each branch terminates with a scaly head of reddish purple florets, having narrow tubes, and cut at their brim into five teeth. They contain flowers, which are succeeded by small oblong seeds crowned with down. The time of its flowering is about July, for the most part. See **ONOCARDUM**.

And in the third division or sort there are only two; as the

## THISTLE.

the *corn sow-thistle*, which is a very troublesome weed in arable land, flowering in July and the succeeding month. See *SONCHUS*.

And the *common* or *field-thistle*, which has many provincial names in different places, as the *horse-thistle*, the *curled thistle*, &c. This is a thistle which is more general in its growth than any of the others, being found not only by the sides of roads, but also in arable and pasture lands, and it is remarkably prickly, growing from two to three feet in height, but the heads of the flowers are small, and of a purplish colour, though sometimes white; it flowers in July, or about that period. See *CARDUS* and *SERRATULA*.

It is obvious, from what has been said, that the annual and biennial sorts of thistles may be readily removed, by preventing their running to seed and disseminating themselves over the land; which is best effected probably by carefully eradicating them, or frequently mowing them over closely by the surface, and rolling. But in the perennial sorts, from their roots continuing in the earth, increasing and throwing out new shoots or stems every year, there is much more difficulty in extirpating them, and they, perhaps, can be no other way completely destroyed than by rooting them out on arable land by trench or deep ploughing and frequent harrowings, or by fallowing or laying the land down to pasture; for the first of these sorts seldom appears in pasture lands. But for destroying the common thistles, the best method is perhaps by cutting them over in the bleeding season frequently by proper implements. The writer of the Berkshire Agricultural Report, who thinks them particularly noxious, troublesome, and inconvenient among the corn and grass crops, proposes drawing them up by an implement of the forceps kind, somewhat similar to that described under the head noticed below, especially the sort which is termed *ferratula arvensis*; or if they be cut over about an inch above the surface of the ground, it is believed they will be liable to rot, on account of the stem being filled with water. They also frequently bleed to death when cut over in this way about the month of August, as hinted at above. See *THISTLE-Drawer*.

Others suggest that thistles might probably be destroyed in arable land by continued fallowing for one or two summers; with such repeated ploughing and hoeing as wholly to prevent their vegetating: but as such a progress would be tedious and expensive, an easy, expeditious, and effectual mode of eradicating them in this case, seems equally wanting and desirable, as in that of grass lands. Thistles are likewise very troublesome in hedges, especially those of the sow and the large rough kinds, and should constantly be rooted out and removed as soon as possible, as no hedge can go on well that is much infested with them. See *THISTLE-Cutter*, *WEED*, and *WEEDING*.

It may be noticed, that by an excellent regulation in France, a farmer may sue his neighbour who neglects to thistle his land at the proper seasons, or may employ people to do it at the other's expence. And it were to be wished that a similar law was enacted here, to prevent the wide-spreading mischief occasioned by the seeding of this pernicious weed; among which may be reckoned, besides its choking the young corn, that if wheat in particular be not well thistled, the reapers take up the grips so tenderly, lest they should prick themselves, that by their loose handling of them, they sometimes leave upon the ground corn enough to sow the whole field. There is much inconvenience often experienced too in working hay from them.

Something in the same way as above has also lately been

done here, especially in regard to the removal of them from the sides of highways and roads.

Though the sow-thistle has commonly been considered as a troublesome and injurious weed in tillage lands, it has lately been conceived by some to possess no small degree of nutrient power; and on this ground it has been suggested by the writer of the "Experienced Farmer," that it may be a plant of considerable fattening properties when properly raised and cultivated. When taken young, and cut or broken, it produces something, it is said, like cream; and he has noticed that many animals eat it in preference to every other plant now in vogue. Sheep, when in clover, &c. will feed upon it so greedily as to eat the very roots. Pigs likewise prefer it to almost any other green food. Rabbits will breed more speedily when fed with sow-thistles, than with any other food he knows of, except dandelion; which is of the same nature: and is now sold in Covent Garden market to the breeders of tame rabbits, to make the does take buck more readily. A man of his acquaintance, who was allowed better skill with stallions than the generality of people, used to search for sow-thistles, and give them to his horses to make them serve mares more readily and effectually. When he could not get sow-thistles, he fed them, it is said, with new laid eggs and milk, or cream, if he could get it; but he preferred sow-thistles or dandelion to any thing.

And there is, he contends, a well-known and remarkable proof of the nourishing and feeding quality of the sow-thistle, in the fat wether sheep fed to such an amazing size by Mr. Trimnel, of Bicker-fen, near Boston, upon fen-land. This sheep, it is said, was bred by Mr. Hutchinson, in Hail-fen, from a ram bred by Mr. Robinson of Kirby, near Sleaford. He never ate any corn, oil-cake, or other similar dry food, but fed wholly on grass and herbage. Being turned with many other sheep into a field of clover, he was observed first to search for the sow-thistles, and would eat no other food while any of these could be found in the parts of the field that were hurdled off successively, a little at a time. None of the other sheep that fed with him, however, shewed any extraordinary liking for the sow-thistle. A small hut was built for him in the field to repose under in hot weather: and when the part that was hurdled off became bare of food, his attendants, on account of his liking for sow-thistles, gathered a quantity of them for him, which they gave him at particular hours, three times a day, from two to five pounds at a meal.

It is added, that when standing on his feet, he measured only two feet six inches high: he was weighed once a month, and weighed alive twenty-six stone, at fourteen pounds to the stone. He gained only one pound the last month: and as it was judged, therefore, that he was quite ripe, and would not increase any more, but might possibly lose weight the next month, he was killed on the 13th of October 1791, by Mr. Isaac Lumby, of Bicker, being then a four-shear, or four-year-old sheep.

The writer further states, that the skin, hung up by the nose part, measured ten feet two inches from the point of the nose to the tip of the tail, and was sold for 7s. 6d. in the common course of business. And that the carcase measured five feet from the nose to the tail; the rump or cushion eight inches and a half in depth; plate or fore-flank the same thickness; breast end seven inches; and was one yard five inches and a half round the collar. That the legs were reckoned at 40lbs. each; but if cut haunch of venison fashion, they would, it is said, have weighed 50lbs. each. Mr. Lumby was offered 2s. a pound for them; so that he could have sold the two legs alone for 10l. when so cut.

This is certainly a remarkable instance of fatness, but it might probably depend more on the disposition of the animal to take on fat, than the fattening quality of the thistle or food on which the sheep was fed. Many further trials are necessary to fully ascertain the point.

THISTLE, *Blessed, carduus benedictus, vel enicus.* See CENTAUREA.

As an article of the *Materia Medica*, the blessed thistle, which is the hairy wild *enicus* of Miller, and the *centaurea benedicta* of Linnæus, was formerly much used in infusion, as a gentle emetic, in fevers and certain nauseae.

Dr. Lewis has often observed excellent effects from a light infusion of *carduus*, in weakness of appetite and indigestion, where the stomach was injured by irregularities, or oppressed by viscid phlegm; nor has he found any one medicine of the bitter kind to sit so easily on weak stomachs, or to heat so little. These infusions, taken freely, promote the natural secretions. Drank warm in bed, they commonly increase perspiration or excite sweat; and as they act with great mildness, not heating or irritating considerably, they have been used, in this intention, in acute as well as chronic cases. The seeds, which, as well as the leaves, have a considerably bitter taste, have sometimes been used as sudorifics or diaphoretics, in the form of an emulsion. Cold water poured on the leaves, extracts, in an hour or two, a light grateful bitterness; by standing long upon the plant, the liquor becomes disagreeable: a strong decoction is very nauseous and offensive to the stomach. The extracts, obtained by inspissating both the cold infusion and decoction, have the same differences as the liquors themselves. Rectified spirit extracts, in a short time, the light bitter part of this plant, but does not take up the nauseous near so easily as water. On keeping the watery extracts for some months, a considerable quantity of saline matter was formed on the surface, in small crystals, resembling in shape those of nitre, in the taste bitterish, with an impression of coolness. Lewis's *Mat. Med.* See CENTAUREA *Benedicta*.

Some distil a water from it, which they use in cordial and sudorific potions.

THISTLE, *Carline.* See CARLINA.

The root of the *carlina acaulis* of Linnæus, is supposed to be diaphoretic, antihysterical, and anthelmintic. It has been greatly esteemed by some foreign physicians, in acute malignant as well as in chronic diseases, and given in substance from a scruple to a drachm, and in infusion from one to two drachms and more. It is rarely to be met with in our shops. See CARLINA *Caulescens*.

THISTLE, *Distaff.* See ATRACTYLIS.

The roots of the *atractylis gummifera* of Linnæus, or pine-thistle, which is a native of Italy and the island of Candy, yield, if wounded when fresh, a viscid milky juice, which concretes into tenacious masses, at first whitish and resembling wax, but when much handled growing black; supposed to be the *ixion*, and *acanthina massliche* of the ancients. The juice is said to have been formerly chewed for the same purposes as mastich, and the root itself of the same virtue with that of the earline thistle. Lewis.

THISTLE, *Fish,* a species of *Carduus*; which see.

THISTLE, *Fuller's.* See DIPSACUS and TEASEL.

THISTLE, *Gentle,* a species of *Carduus*; which see.

THISTLE, *Globe.* See ECHINOPS.

THISTLE, *Golden.* See SCOLYMUS.

THISTLE, *Hedge-hog,* a species of *Cardus*; which see.

THISTLE, *Ladies,* or *Milk,* a species of *Carduus*; which see.

THISTLE, *Melon.* See CACTUS.

THISTLE, *Sow.* See SONCHIUS.

THISTLE, *Downy Sow.* See ANDRYALA.

THISTLE, *Star.* See CENTAUREA.

THISTLE, *Torch.* See CACTUS.

THISTLE, *Woolly.* See ONOPORDUM.

THISTLE-CUTTER, in *Agriculture*, a tool of the sward-dressing kind, for cutting up thistles and other coarse weeds and plants.

An effective implement of this sort has lately been invented, delineated, and described by Mr. Amos, in his work on "Agriculture and Planting."

The plan of the whole machine, when complete, is that of a sort of square, in which the leading share is made of cast-steel, in the form of an isosceles triangle, whose equal sides are fourteen inches long, and its base twelve inches, being about one-eighth of an inch thick in the middle, tapering to a very fine edge on the outsides. There are four pieces of ash-wood, three inches square, and two feet four inches long, to which the scythes are fixed, and which are called the scythe-handles. There are also four scythes, three feet long from point to point, four inches broad at the widest part, made of cast-steel, and which, the inventor says, are manufactured by Messrs. Hunt and Company, at their cast-steel manufactory, Brades, Birmingham. There are likewise four other pieces of ash-wood, three inches square and two feet five inches long, for throwing the two hindmost scythes to their proper distance, and which are braided two and two together by four bars, which are one by two inches square, and eighteen inches and one-fourth long. And there is a main piece of ash-wood, three by four inches square, and five and a half feet long, to which all the other pieces are fixed by hooks, and eye-bolts, by means of which the scythe-handles act as it were upon hinges, and the scythes are thereby made to form the same parallel line with the surface of the land, whether it be concave, convex, or level. For this purpose, it is suggested that it might be useful to make a joint in the middle of this piece, where the land is uneven. And in the fore part of this piece a sawgate is to be made, three-fourths of an inch from the under side, at the hind part of the share, and one inch from the under side at the front of the wood, which gives an elevation to the point of the share, to receive the share where it is fixed.

There are four iron braces, one of the ends of which are fixed in the scythe-handles, and the other ends to the under sides of the scythes by a screw. There is a staple, to which the chain and swinging-tree is fixed, and by which the machine is drawn. There are two mortise-holes on the sides, which receive the tenons of two upright studs, to which pullies are fixed for lifting the scythes off the ground, where there is any thing to obstruct them or retard their progress. Each of these studs is one and a half by four inches square, and three feet long. Two small pullies are fixed on each side of these upright studs. Through the pullies of the foremost stud, a small rope passes (one end of which is fixed to the outsides of the iron braces), and likewise through the pullies of the hindmost stud, and then the two ropes unite at about two or three feet behind the whole machine; and through the pullies of the hindmost stud pass two other small ropes (one end of each being fixed to the outside of the hindmost iron braces), and then the four ropes unite together, where the manager holds them as a coachman does the reins of four horses. By means of these ropes the scythes may be lifted to any degree of elevation, by which contrivance any unevenness of the ground, or other obstructions on its surface, such as stones, roots, ant-hills, &c. &c. may be easily avoided and passed by.

The swinging-tree is thirty-three inches long, and the chain

chain which hooks into the staple for drawing the machine by, is thirty inches long.

The whole of the scythes, when properly fixed, projects beyond the wood, and cut the thistles three-quarters of an inch above the surface of the ground.

In cases where the scythes want sharpening, it is observed that they may be reared perpendicularly up, or taken off entirely; and that, at the same time, the horses should be ungeared and taken away.

In using the machine, it is advised by the ingenious inventor, that as soon as the thistles are in full flower it should be set to work, the length way of the ridges; and that if the scythes are kept very sharp, it will make excellent work. And when the thistles have been cut, they should lie a day or two, it is said, to perish by the loss of their sap-juice: the ground must then be cleared, and the close or field rolled, the cross way of the ridges, with a very heavy roller, which so crushes the hollow stumps, and renders them so pervious to water, that their roots soon rot and are destroyed. But to expedite the operation of the implement, and the destruction of the weeds and plants, the land should be cleaned of all kinds of rubbish, the latter end of March or beginning of April, being dressed with the sward-dresser, and then rolled the cross way of the land, or ridges, with a weighty roller, as just mentioned. See *Sward-Dresser*.

*THISTLE-Drawer*, an useful implement of the forceps kind, which is extremely beneficial in drawing up the common field-thistle and some other strong sorts of weeds. It may be constructed either of wood or iron, in the latter case having sockets for receiving wooden handles. When made of wood, it should be of the hard and less brittle kind, as good tough ash. It is usually formed from two to three feet in length, having six notches or blunt teeth cut in each blade, at the bottom part, where it bites or seizes the plants, and each arm well fitted to the other, turning upon a strong pivot or pin. In its operation the thistle is seized close to the ground and firmly held, so as to be drawn out with considerable length of root. It has been long in use in the northern parts of Lancashire; and is said to be lately introduced from Wiltshire into the county of Gloucestershire, in the agriculture report of that district. It is an useful and effective tool for the above purpose, and only costs about two shillings when made of wood, and three or four when of iron. It has long been known in the first of the above counties by the provincial name of *Gripes*.

*THISTLE-Fly*, in *Natural History*, a small fly produced from a fly-worm hatching in the protuberances of the *carduus hæmorrhoidalis*. In the protuberances of this thistle, while they are closed in all parts, the worm of this fly, from whose injuring it, at the time of depositing the egg from which it was hatched, the protuberances arose, undergoes its last transformation. It here makes of its own skin a shell in form of an egg, within which it puts on the nymph state. When this nymph becomes a living fly, the least part of its difficulty is the finding its way out of this shell; it has a stronger prison than that, and before it can obtain its liberty, must force its way through the much more closely compacted fibres of the protuberance of the vegetable. It has, however, no other means of doing this difficult work, but that of inflating its head, and throwing out the bladder or muzzle with which all these creatures are provided in this state. See *THISTLE-Galls*.

This is a difficult operation, and many of the creatures perish in the attempt; but what much forwards the success of it, in many cases is, that the stalk of the thistle often becomes naturally half rotten before the time of the fly's egress. Reaumur, *Hist. Inf.* vol. iv. p. 338.

*THISTLE-Galls*, a name given by the more accurate authors to the protuberances on the stalk of a species of thistle, called by authors *carduus hæmorrhoidalis*, from those tubercles, which are supposed to resemble those of the hæmorrhoidal veins in persons subject to the piles. These have been supposed a natural production of the plant; but they are far otherwise. The whole history of them is, that a certain species of fly always deposits its eggs on the stalks; and the young ones, when hatched, gnaw their way into the substance of the stalks, and the copious derivation of the juice, occasioned by their sucking, produces the tubercles which are found on it.

These tubercles are of a roundish or oblong figure, and are of various sizes, from that of a pea to the bigness of a nutmeg; they are much harder than the rest of the stalk, approaching to a woody structure; when cut open, they are found to contain each several oblong and narrow cells; these have no communication with one another, and are each inhabited by a small white worm, which has two hooks at the head; with these it breaks the fibres of the plant, in order to get at its juices. When it has arrived at the time of its change into the nymph state, it ceases to eat, and drawing up its body much shorter than usual, its skin hardens, and forms a shell, under which it changes into a very beautiful two-winged fly; the wings are whitish and transparent in the middle; and at the edges surrounded with black in the form of a chain of figures like the letter Z; the body and breast of this fly are of a beautiful black, with some slight variations of yellow, with which the shoulders are streaked; the anterior part of the head is white, and its back-part edged with a yellow down; the antennæ are reddish, and the legs are partly black, and partly of a fine clear brown.

In observing the changes of the worms of these galls, there are often observed some which go through them in a different manner from the rest, and finally produce a very different species of fly. These are the progeny of the eggs of some other species of fly, whose worm being carnivorous, is lodged by the art of its parents, while it is yet in the egg state, in the substance of this gall, there to prey upon the defenceless inhabitants.

There are many species of galls the inhabitants of which are exposed to enemies. In those it is common to find the proper inhabitant and the devourer in the same cell; the one feeding on the juices of the plant, the other on its juices; but this is not the case here, these worms immediately destroying the proper inhabitants, and being found always alone in their cells. Reaumur, *Hist. Inf.* vol. vi. p. 221.

*THISTLE*, *Order of*. See *ANDREW*.

*THISTLE*, *our Lady of the*, was also a military order, instituted in 1370, by Louis II. duke of Bourbon. It consisted of twenty-six knights, of which that prince and his successors were the chiefs. Their badge was a sky-blue girdle; and, on solemn occasions, a mantle of the same colour, with a gold collar, interwoven with flower-de-luces; among which was the word *esperance*, *hope*, in capitals.

*THISTLE-TAKE*, a custom in the hundred of Halton, in the county of Chester, whereby, if in driving beasts over the common, the driver permits them to graze, or take but a thistle, he shall pay a halfpenny a beast to the lord of the fee.

At *Fiskerton*, in Nottinghamshire, by ancient custom, if a nati e, or cottager, killed a swine above a year old, he paid the lord one penny, which was also called thistle-take.

*THIVA*, or *STIBES*, in *Geography*, a town of European Turkey,

Turkey, in the province of Livadia, anciently called "Thebes," and the capital of Bœotia, situated on a rising ground between two small rivers, supposed to be the Ilmenus and Dirce of the ancients. (See THEBÆ.) The town is of an oval form, about three miles in circumference, and the houses are higher and better built than is usual in most parts of Greece. It contains four or five thousand inhabitants, about half Turks and half Christians, which latter have several churches, not remarkable for any thing except some few inscriptions to be seen upon the pavement of the cathedral. The air of the country about Thebes is thick and foggy, whence the ancient inhabitants of Bœotia were accounted dull and phlegmatic, and were neither famous for their wit nor valour. (See BŒOTIA.) Epaminondas raised Thebes to its highest pitch of grandeur; after whose death it was not remarkable for its virtues, but misfortunes, till it sunk into its original obscurity; so that its glory took birth with this great man, and with him expired; 28 miles W.N.W. of Athens. N. lat. 38° 25'. E. long. 23° 34'.

THIVIERS, a town of France, in the department of the Dordogne; 7 miles N.W. of Exideuil.

THIULETIS-TSKALI, a river of Georgia, which runs into the Kur.

THIZY, a town of France, in the department of the Rhone and Loire; 27 miles N.W. of Lyons.

THLASIAS, a term used by the ancients to express an enuch made by a compression or contusion of the testicles, not by the cutting them out.

THLASIS, a word used by the ancients to express either a contusion without a wound, or a wound made by some blunt instrument, which contused the parts.

THLASMA, a word sometimes used like *thlasia*, to express a contusion either with or without a wound; sometimes applied particularly to a recess of the cranium inward without a fracture, an accident principally affecting children.

THLASPEOS SEMEN, in the *Materia Medica*, the name of a seed produced by the common *thlaspi arvense siliquis latis*, or common treacle-mustard. It used to be an ingredient in several of our shop compositions, and was esteemed attenuating, detensive, and aperient, and is said to promote urine and the menses, and to expel the after-birth.

THLASPI, in *Botany*, θλασπι, an ancient name, which Dioscorides tells us, in his book 2. chap. 186, originated in the broken, or pounded, appearance of the seed, alluding, we suppose, to its smallness. The word therefore is derived from θλασσι, to bruise, or beat. He compares this seed to that of his κκερασμα, our *Lepidium sativum*, or Garden Cress, adding that the seed-vessel is moderately dilated upwards, the flower white, and the plant found about paths, walls, and banks. Every other part of his description, respecting the leaves and stems, is so apposite, that no doubt can remain of his θλασπι being our Shepherd's Purse, which Dr. Sibthorp found common in Greece and the Archipelago, in the early spring. Linnæus might surely have spared his mark of uncertainty concerning the etymology of the above name, in *Phil. Bot.* 183. But as he translates θλασσι by the Latin word *comprimo*, to compress, he, most likely, had in view the *Tb. arvense*, which several old writers have taken for the plant of Dioscorides, and whose seed-vessel is very remarkably compressed.—Linn. Gen. 334. Schreb. 437. Willd. Sp. Pl. v. 3. 442. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 683. Compend. ed. 2. 98. Prodr. Fl. Græc. Sibth. v. 2. 7. Brown in Ait. Hort. Kew. v. 4. 80. Juss. 241. Lamarck Illustr. t. 557. Gærtn. t. 141.—Class and order, *Tetradynamia Siliculosa*. Nat. Ord. *Siliquosæ*, Linn. *Crucifera*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of four ovate, concave,

somewhat spreading, deciduous leaves. *Cor.* cruciform, equal, of four obovate petals, twice the length of the calyx, with narrow claws. *Stam.* Filaments six, but half the length of the corolla, the two opposite ones still shorter; anthers pointed. *Pist.* Germen superior, roundish, compressed, emarginate; style simple, the length of the stamens; stigma obtuse. *Peric.* Pouch compressed, inversely heart-shaped, emarginate, the style being mostly the length of the notch in which it stands, of two cells, the partition lanceolate, and the valves boat-like, with more or less of a dilated keel. *Seeds* several in each cell, pendulous, inserted into the sutures, roundish, compressed.

Ess. Ch. Pouch compressed, emarginate, inversely heart-shaped; its valves boat-like, keeled. *Seeds* several.

Obs. Mr. Brown has very happily separated from this genus the Linnæan *Tb. campestre*. That species, on account of its solitary seeds, properly belongs to *Lepidium*, to which genus it, as well as *Tb. hirtum*, is removed in the new edition of our *Compendium Fl. Brit.* The same ingenious botanist, of whose elucidation and reformation of the cruciform genera we have spoken under the article TETRADYNAMIA, has founded a new genus, called *Aethionema*, upon *Tb. saxatile*, with another species, whose pouch has no valves, and only a single seed. With this latter, a Spanish plant, we are unacquainted; but as the *saxatile* has two cells, and many seeds, we can hardly either disjoin it from *Thlaspi*, or unite it with this, though, it seems, they agree in having an unequal insertion of their calyx-leaves, which in *Thlaspi* is equal; and their longer filaments are either combined, or else toothed near the top. As there are but two species, we presume one of these last characters belongs to each. The question seems at least doubtful, and therefore, without presuming to form an opinion respecting Mr. Brown's *Aethionema monospermum*, we prefer keeping his *saxatile* where it is.

The plants of this genus are herbaceous, and most of them annual, with simple leaves, and numerous corymbose flowers; their surface more frequently smooth, and somewhat glaucous, than pubescent; stem leafy and branched.

1. *Th. peregrinum*. Red Penny-Cress. Linn. Sp. Pl. 901. Willd. n. 1. Scop. Carn. v. 2. 17. (Th. capsulâ cordatâ, peregrinum; Bauh. Hist. v. 2. 927, badly copied in Morif. sect. 3. t. 18. f. 30.)—Pouches roundish-heartshaped. Leaves lanceolate, entire.—Native of dry hills, above Heidenchaft in Carniola. *Scopoli*. Of this very rare plant we have never seen a certain specimen. *Scopoli* says the stems are a span high, hard, branched, turning reddish, as well as the leaves, as they advance in age. The leaves grow on short stalks. Flowers small, red, with entire ovate petals, and reddish stamens. Anthers yellow, as well as the short style, and the stigma, which last is flat at the top. Seeds two in each cell, ovate, yellowish, slightly rugged, shining, attached to the falcate partition.

2. *Th. arabicum*. Purple Arabian Penny-Cress. Vahl Symb. v. 2. 76. Willd. n. 2. (Th. humile, spicâ purpureâ; Buxb. Cent. 1. 2. t. 2. f. 1. Iberis arabica; Linn. Sp. Pl. 906. Am. Acad. v. 4. Subularia purpurea; Forfk. Ægypt.-Arab. 117.)—Pouch nearly orbicular, compressed, with a notch at each extremity. Lower leaves wedge-shaped; upper oblong-heartshaped, entire, clasping the stem.—Native of Arabia and Cappadocia.—The root is tapering, fibrous, annual. Stem more or less branched, round, smooth, from three to six inches high, leafy, corymbose. Leaves an inch long, acute, entire, smooth, rather succulent, slightly stalked. Flowers small, purple or reddish. Pouch light green, with a very broad striated border, much exceeding the style, and notched at the base as well as summit.

## THLASPI.

summit. *Seeds* two in each cell. This species appears nearly related to the foregoing, nor should we be greatly surpris'd if they proved one and the same. If Bauhin's delineation of the *pouch* of the former be correct, they must be distinct.

3. *Th. arvensis*. Common Penny-Creeps, or Smooth Mithridate Mustard. Linn. Sp. Pl. 901. Willd. n. 3. Fl. Brit. n. 1. Prodr. Fl. Græc. n. 1. Engl. Bot. t. 1659. Curt. Lond. fasc. 6. t. 43. Fl. Dan. t. 793. (Th. Dioscoridis; Ger. Em. 262. Th. secundum; Matth. Valgr. v. 1. 519. Camer. Epit. 337.)—*Pouch* orbicular, compressed, entire at the base. Leaves oblong, toothed, smooth.—Native of cultivated fields, in most parts of Europe, but not frequent in England. It is annual, flowering in June and July. Dr. Sibthorp met with it in the countries north of Greece. The *root* is small, and tapering. Whole *plant* smooth, about a foot high, branched; the *stem* leafy, angular upwards. *Leaves* two or three inches long, clasping the stem with their arrow-shaped base; their edges wavy and toothed. *Flowers* numerous, small, white. *Pouch* large, erect, almost perfectly orbicular. *Style* much shorter than the notch in which it stands. *Seeds* numerous. The warm pungent taste of this plant is combined with a disagreeable garlick flavour. The *seeds*, as observed in Engl. Bot. "make an ingredient in that nauseous opprobrium of pharmacy, the Mithridate Confection, the receipt for which may be found, with many excellent critical remarks, in Lewis's Dispensatory." See MITHRIDATE.

4. *Th. alliaceum*. Garlick Bastard-Creeps. Linn. Sp. Pl. 901. Willd. n. 4. Ait. n. 2. Jacq. Ic. Rar. t. 121. (Th. allium redolens; Morif. sect. 3. t. 18. f. 28.)—*Pouch* nearly obovate, tumid, with a narrow border. Leaves oblong, obtuse, smooth, somewhat toothed.—Native of the south of Europe. An annual herb, much resembling the last, but the *leaves* are blunter, and less toothed. The *pouches* are very different, having but a slight border at their upper part only, their base being wedge-shaped.

5. *Th. Psychine*. Long-styled Bastard-Creeps. Willd. n. 5. (Psychine stylosa; Desfont. Atlant. v. 2. 69. t. 148. Bursa pastoris hirsuta, eruce flore, stilo prominente; Shaw Afric. n. 91. f. 91.)—*Pouch* abrupt. *Style* prominent. Leaves heart-shaped-oblong, toothed, downy, clasping the stem.—Native of the borders of fields in Barbary. *Root* annual. *Herb* larger than the foregoing, and clothed with hoary hairs. *Leaves* rounded, not acute, at the base. *Flowers* pale yellow, as large as the Common Mustard. *Pouch* wedge-shaped, or triangular, being quite abrupt at the end; the *style*, which is as long as the whole pouch, standing prominent at the summit. Willdenow is certainly correct as to the genus.

6. *Th. saxatile*. Rock Bastard-Creeps. Linn. Sp. Pl. 901. Willd. n. 6. Jacq. Austr. t. 236. (Lithothlaspi quantum, carnosu rotundo folio; Column. Ecphr. 279. t. 277. f. 2. Aethionema saxatile; Br. in Ait. Hort. Kew. v. 4. 80.)—*Pouch* nearly orbicular; concave above; convex below. Stems mostly simple. Leaves linear-lanceolate, fleshy, obtuse.—Native of dry hills, and the clefts of rocks, in Italy, Austria, Switzerland, Greece, and the south of France, flowering in April and May. The *root* is perennial, and in some degree woody, though generally marked as annual. *Stems* annual, ascending, six or eight inches high, round, leafy, rarely subdivided. *Leaves* numerous, scattered, on short stalks, glaucous, smooth, entire, three quarters of an inch long; the lower ones rather elliptical. *Flowers* small, pink, numerous, in dense terminal *corymbs*, soon elongated into lax *clusters* of glaucous *pouches*, tinged with pink, each on a slender, spreading, partial stalk; their border

broad, striated, somewhat crenate, emarginate at the top only, where the minute *style* is situated. The shrubby habit, glaucous hue, and very pretty little red *flowers* with a pale-green *calyx*, render this one of the most elegant plants of its natural order. *Iberis saxatilis*, Linn. Sp. Pl. 905, distinguished from this by the accurate Fabius Columna, and figured in the same plate of his work, is so like it, that they are hardly to be known asunder, except by the unequal *petals*, proper to *Iberis*, and the downiness of this latter plant. On a close comparison, the shapes and surfaces of their *seed-vessels* will be found essentially different.

7. *Th. montanum*. Mountain Bastard-Creeps. Linn. Sp. Pl. 902. Willd. n. 9. Ait. n. 7. Jacq. Austr. t. 237. (Th. montanum, burse pastoris fructu; Column. Ecphr. 275. t. 276. f. 1. Th. præcox; Wulf. in Jacq. Coll. v. 2. 124. t. 9. Lepidium n. 518; Hall. Hist. v. 1. 223. β. Th. alpinum; Jacq. Austr. t. 238. Willd. n. 10. Crantz Austr. fasc. 1. 25. t. 3. f. 1. (Th. minimum; Arduin. Spec. 2. 33. t. 15. f. 2.)

*Pouch* inversely heart-shaped. Leaves smooth, nearly entire; radical ones obovate, stalked; the rest sessile, clasping the stem. *Petals* thrice as long as the calyx. Stems simple.—Native of stony places, on the lofty mountains of Switzerland, Austria, Dauphiny, and Italy, flowering in April or May. The *roots* are perennial, long, subdivided at the summit, each trailing shoot crowned with a tuft of obovate *leaves*, rarely a little serrated, their size, and the length of their *footstalks*, varying according to luxuriance of soil, or a more or less elevated place of growth. From the centre of each tuft arises a solitary, simple, ascending or upright *stem*, from three inches to a span long, round, smooth, clothed with numerous, alternate, sessile, cordate or arrow-shaped, very rarely toothed, *leaves*, whose base is more or less elongated and acute; their length three quarters of an inch. *Flowers* in solitary terminal *corymbs*, numerous, large, white and handsome; their broad, obovate, spreading *petals* at least thrice as long as the smooth, often purplish, *calyx*. *Pouch* tapering at the base; more or less deeply lobed at the end, with a *style* almost as long as itself, projecting far beyond the lobes. *Seeds* naturally two in each cell, as Jacquin describes them. Haller found one only. This may be accounted for from their being often abortive, as indeed are generally most of the *pouches* themselves, the plant increasing much by root. Having had occasion to study this and the neighbouring species very minutely, in our investigation of Swiss and British plants, we can with confidence maintain the correctness of our synonyms, on the authority of original specimens. Our β alone is entitled to be distinguished as a variety, and that an insignificant one, being merely rendered small in size by its very elevated or exposed situation. The faithful Jacquin himself evidently mistrusted this supposed species, though he says it retained the same habit when cultivated.

8. *Th. alpestre*. Alpine Shepherd's Purse. Linn. Sp. Pl. 903. Willd. n. 12. Fl. Brit. n. 5. Engl. Bot. t. 81. Ait. n. 6. (Th. foliis globulariæ; Raii Syn. ed. 2. 175. ed. 3. 305. Bauh. Hist. v. 2. 926. Th. montanum secundum badense; Clus. Hist. v. 2. 131. Th. albi supini varietas; Ger. Em. 268. f. 2. Lepidium n. 519; Hall. Hist. v. 1. 223, on the authority of specimens from Davall and Du Cros.)—*Pouch* obovate, abrupt, somewhat heart-shaped, with many seeds. Stem-leaves arrow-shaped. Stems simple. *Style* prominent.—Native of mountainous pastures in Switzerland and England, flowering in June and July. It abounds on limestone rocks, and about lead-mines, in Yorkshire and Derbyshire. Many authors have confounded this

this with the last, from which it differs in having a tufted *root*, not throwing out scyons, or runners; usually taller and more numerous *stems*; more glaucous herbage; much smaller *flowers*, whose *petals* are erect, and though variable in dimensions, never a quarter so large as in *montanum*; but above all, in having at least three or four *seeds* in each cell. The *pouches* moreover are always numerous, and all perfect. Their terminal lobes are variable in length or dilatation, but constantly much shorter than the *style*. (See the following.) We have often been inclined to remove from this species to the foregoing the synonyms of Bauhin, Clusius, and Gerarde, cited in *Fl. Brit.* on account of the large spreading *petals* of their figures. But this appears to be an inaccuracy on their part. The habit of their plant; several *stems* from the simple crown of the *root*; and the copious *pouches* in long continued *clusters*, all properly belong to our *alpestre*, by no means to *montanum*. We have some suspicion that the *alpestre* is rather biennial than perennial. It never remains long in gardens, but that is no proof, nor have we had an opportunity of watching the plant through a season, on its own native hills. Hudson mistook the *perfoliatum*, next described, for *alpestre*.

9. *Th. perfoliatum*. Perfoliate Shepherd's Purse. Linn. Sp. Pl. 902. Willd. n. 11. *Fl. Brit.* n. 4. *Engl. Bot.* t. 2354. Jacq. *Austr.* t. 337; not. 237, as in Willdenow. (*Th. alterum mitius rotundifolium, burfæ pastoris fructu*; Column. *Ecphr.* 278. t. 276. f. 2. *Th. rotundifolium*; Ger. Em. 266. *Th. cordatum minus, flore albo, inspidum*; Barrel. *ic.* t. 815. *Th. tertium pumilum*; Clus. *Hist.* v. 2. 131. *Th. minus Clusii*; Ger. Em. 268. *Nasturtium* n. 510; Hall. *Hist.* v. 1. 220. *Pilosella filiquata*; Thal. *Harcyn.* t. 7. f. C, at the end of Camer. *Hort.*)—Pouch exactly inversely heart-shaped. Stem-leaves heart-shaped, sharpest at the base, clasping the branched stem. Style very short.—Native of calcareous pastures or rocks, walls, and dry places, in Switzerland, Germany, France, Italy, Greece, and England, flowering in the spring. In the last-mentioned country it is hardly known any where but in the limestone part of Oxfordshire, about Witney and Burford. We have gathered it at Caserta, near Naples. The *root* is fibrous and annual. *Stem* branched from the bottom, except on poor ground, usually from four to six inches high, round, smooth, leafy. *Leaves* glaucous, smooth, various in size, entire, or now and then slightly toothed; the radical ones stalked, ovate, obtuse; the rest sessile, alternate. *Flowers* white, small, with narrow, erect *petals*. *Style* so short as to be scarcely discernible between the rounded lobes of the *pouch*. *Seeds* three or four, at least, in each cell. The small annual *root*, usually branched *stem*, and minute *style*, are quite sufficient to distinguish this species from the last, with which it has been confounded; nor is it difficult, with a moderate degree of observation, to avoid the error of those old botanists, who described its starved and luxuriant states for distinct species. Ray suspected this, and has adverted to it in his own second edition of the *Synopsis*, by far the most exact, p. 176.

10. *Th. luteum*. Yellow Sicilian Shepherd's Purse. Bivon. Cent. 1. 78. ("Th. *montanum, glasti folio, parvum, perfoliatum, nonnihil ferratum, silicula cordatâ*; Cupan. *Panphyt.* v. 2. t. 256. *Th. montanum luteum, glasti folio, parvum, perfoliatum, nonnihil ferratum, siliculâ cordiformi*; Cupan. *Hort. Cathol.* 212.")—Pouch inversely heart-shaped, nearly orbicular. Leaves toothed, the lowermost stalked; the rest clasping the stem. Style almost equal to the lobes of the seed-vessel.—Native of dry mountainous places near Palermo, flowering in April and May, and sent us by the baron Bivona. This is a small, smooth, glaucous,

annual *plant*, from one to three inches high. *Stem* erect, either simple, or branched from the base. *Leaves* half an inch, more or less, in length; the lower ones spatulate; the others ovate-oblong, bluntish, with a heart-shaped base; all having one or two large teeth at each side. *Flowers* remarkable for being yellow. They are small, not many together, in short terminal *corymbs*, becoming elongated *clusters* of rather large, rounded, reticulated *pouches*, with a few *seeds* in each cell. The *petals* are emarginate, erect, longer than the *calyx*. *Stigma* large, on a level with the lobes of the pouch.

11. *Th. Bursa Pastoris*. Common Shepherd's Purse. Linn. Sp. Pl. 903. Willd. n. 13. *Fl. Brit.* n. 6. *Prodr. Fl. Græc.* n. 1499. *Engl. Bot.* t. 1485. *Curt. Lond. fasc.* 1. t. 50. (*Bursa Pastoris*; Ger. Em. 276. Matth. *Valgr.* v. 1. 521.)—Hairy. Pouch inversely heart-shaped, somewhat triangular, scarcely bordered. Radical leaves pinnatifid.—A very common weed in cultivated and waste ground, throughout Europe, as well as in North America, and in most countries where European merchandise or cultivation has reached. We have already mentioned that this species is indubitably the  $\theta\lambda\alpha\sigma\pi\iota$  of Dioscorides. It flowers at all times, from the beginning of spring to the end of autumn. The white tapering annual *root* is distinguished by a very peculiar nauseous smoke-like scent, when pulled out of the ground. Whole *herb* rough with starry as well as prominent hairs. *Stem* various in height, erect, round, with alternate spreading *branches*, though sometimes so starved as to be quite simple and slender, with all the *leaves* of the plant undivided; in which state the species is difficult to be recognized. The radical *leaves* are numerous, close to the ground, variously pinnatifid, mostly toothed, somewhat lyrate, about two or three inches long; the rest linear-oblong, acute, sessile, entire or toothed, embracing the stem with their elongated heart-shaped base. *Flowers* small, white, in dense *corymbs*, often tinged with purplish-brown. *Pouches* smooth, fatchel-shaped, whence the modern name, disposed in very long, lax, upright *clusters*. *Style* rather prominent. *Seeds* numerous, small, oval, a favourite food of small birds, as well as the flower-buds. The flavour of both is warm and pungent.

12. *Th. ceratocarpon*. Horned Shepherd's Purse. Murray in *Comm. Goett.* v. 5. 21. t. 1. Linn. *Suppl.* 295. Willd. n. 14. Ait. n. 3. Scop. *Infub.* v. 1. 10. t. 4.)—Very smooth. Pouch obovate, tumid, with a terminal, double horn-like, compressed border. Leaves lanceolate, somewhat toothed; arrow-shaped at the base.—Native of Siberia, from whence Pallas brought the seeds. The *root* is annual, tapering. *Stem* solitary, erect, twelve or eighteen inches high, leafy, mostly quite simple. *Leaves* all smooth, slightly toothed, or wavy; the radical ones obovate, on long stalks; the rest sessile. *Flowers* numerous, white, very small. *Pouches* composing a long *cluster*, very conspicuous for their two sharp prominent horns, between which stands the very short *style*. *Seeds* large, about two in each cell.

THLASPIDIUM,  $\theta\lambda\alpha\sigma\pi\iota\delta\iota\upsilon\upsilon$  of Cratevas, according to Tragus; a name whose etymology has been mistaken, like THLASPI, (see that article,) from whence it is manifestly derived. Tournefort, who in his *Institutiones* 214, adopts this name, for what Linnæus more aptly termed *Biscutella*, explains it as meaning that the plants which bore it were allied to *Thlaspi*; and this, no doubt, is correct. But Ambrosini, who considers *Thlaspi* itself as applying to the beaten or flattened form of the seed-vessel, deduces the present word from  $\theta\lambda\alpha\upsilon$ , to bruise or beat, and  $\alpha\sigma\pi\iota\delta\iota\upsilon\upsilon$ , a little shield, which is evidently applicable to the flat shield-like fruit of *Thlaspi arvense*, and is so plausible an explanation, that

that it seems to have chiefly led the modern expounders of ancient writers to take this species for *θλασσις* of Dioscorides. We have already, in its proper place, shewn our Shepherd's Purse to be what he describes; and we can understand the name, as derived from *θλασσις*, in no other light, than alluding to the minute seeds, which seem as if beaten to powder. This is by no means the first instance, in which the most apparently just etymology, proves not to be the real one.

**THLIBIÆ**, in *Antiquity*, a kind of eunuchs. See **THLASIAS** and **CASTRATION**.

**THLIPSIS**, *Θλιψις*, is used, by anatomists, for the compression of any vessel or aperture, by which its cavity is lessened.

**THNETOPSYCHITES**, composed of *θνηστος*, mortal, and *ψυχη*, soul, in *Ecclesiastical History*; a sect in the ancient church, who believed the soul of man perfectly like that of brutes; and taught that it died with the body. See **SOUL**.

We meet with no account of these heretics any where but in J. Damascenus *Hæres.* 90, unless they be the same with those Eusebius speaks of, *Hist. Eccl.* lib. ix. c. 38, who relates, that in Origen's time, there were heretics in Arabia, who taught, that the soul of man died with the body; but that it should rise again with it at the end of the world. He adds, that Origen refuted them in a numerous council, and reclaimed them from their errors. St. Augustine and Isidore call them the Arabian heretics.

Marshall, in his tables, uses the word *Thenopsychites* instead of *Thnetopsychites*.

**THOA**, in *Botany*, a Guiana name adopted by Aublet, and retained by Jussieu, and even Schreber; see our article **GNETUM**, to which genus this plant is there, for the first time, referred, as a second species.

**THOALABIAN**, in *Geography*, a town of Arabia, in the province of Nedsjed; 260 miles E.N.E. of Hajar.

**THOANHOA**, a town of Cochinchina, at the bottom of a large bay. N. lat. 16° 45'. E. long. 106° 27'.

**THOARD**, a town of France, in the department of the Lower Alps; 9 miles E.S.E. of Sisteron.

**THOCO**, an island in the Grecian Archipelago, near the coast of Greece, about eight miles in circumference. N. lat. 37° 20'. E. long. 23° 21'.

**THOCOS**, *Θακος*, in *Antiquity*, the same with *Thacas*.

**THOGRAI**, in *Biography*, a Persian of Ispahan, who was grand vizier to the sultan Malich Mashud, is celebrated for his poetical talents, a specimen of which is given by Poccocke; and for a commentary upon the republic of Plato, to whom the Saracens paid little attention. After a strange reverse of fortune, Thograi was put to death by order of the sultan in the year 1121.

**THOIRY**, in *Geography*, a town of France, in the department of the Ain; 6 miles S.S.W. of Gex.

**THOKES**, in our *Old Writers*, fish with broken bellies, forbid by statute to be mixed or packed with tale-fish. 22 Ed. IV. cap. 2.

**THOLEN**, in *Geography*. See **TOLÉN**.

**THOLEN**, in *Sea Language*, denote small pins driven perpendicularly into the upper edge of a boat. In rowing, the oar passes between the two tholes, in the space called the *row-lock*. Sometimes there is only one pin to each oar, as in the boats navigated on the Mediterranean sea: in that case the oar is hung upon the pin by means of a strop.

**THOMÆANS**, **THOMEANS**, **THOMITES**, or *Christians of St. Thomas*, a people of the East Indies, in Cochin, and upon the coast of Malabar and Coromandel, who, according to tradition, received the Gospel from the apostle St. Thomas.

It appears by the testimony of Cosmas, who wrote about

A.D. 547, and whose work is translated by F. Montfaucon, that Christianity was established in India in the sixth century. We also find in the subscriptions of the council of Nice, that of a prelate, who calls himself bishop of Persia. Moreover, an ancient author, cited by Suidas, says, that the inhabitants of Interior India, (a name which Cosmas gives to the coast of Malabar,) the Iberians and Armenians, were baptized under the reign of Constantine.

The princes of the country, and particularly Serant Perourmal, emperor of Malabar, the founder of the city of Calicut, A.D. 825, granted extraordinary privileges to these Christians.

When Vasco de Gama, the Portuguese admiral, arrived at Cochin with a fleet, in the year 1502, these Christians sent deputies to him, imploring his protection, and that of the king his master. The admiral treated them kindly, but was in no condition to afford them any effectual assistance, in relieving them from the yoke of the Pagan kings, to which they were then subject. The language they use in *sacris*, is the Syriac, or, as some say, the Chaldee; but their ordinary language is the same with that of their neighbours. The first missionaries, who attempted to proselyte them to the church of Rome, were Cordeliers, but their endeavours proved ineffectual. The distinguishing opinions and religious rites of these Christians are as follow.

They are charged with an invincible attachment to the doctrine of Nestorius, and with an obstinate refusal to acknowledge, that the Virgin is the mother of God: they have no images in their churches: they believe that the souls of the blessed are not admitted into the presence of God till after the day of universal judgment: they allow only of three sacraments, *viz.* baptism, orders, and the eucharist: they defer the baptism of infants for some time, as for a month, or even for seven, eight, or ten years, after they are born: they make no use of holy oil, neither in baptism, nor in the administration of the other sacraments; but after baptizing their infants, they sprinkle the oil of a species of Indian saffron all over their bodies: they allow of no auricular confession, treat purgatory as a fable, and their priests are permitted to marry: they entertain an extraordinary affection for the Nestorian patriarch of Babylon, but will not suffer any mention of the pope, or of the Romish churches in their assemblies. Their days of abstinence are Wednesday and Friday, and their fast is very severe in Lent, during which time they go to church three times a day. They also fast in the same manner during the time of Advent. Besides these two greater fasts, which are enjoined on pain of excommunication, they have several others of a religious nature. Their women do not enter a church for forty days after their delivery of a male child, nor for eighty days after the birth of a daughter.

These Christians are in general poorly instructed, knowing only the Lord's prayer and the angelical salutation. Their churches are mean and unadorned buildings, and constructed after the manner of the pagodas. They appear to maintain many of the religious opinions and practices received among Protestants, and reject either wholly, or in a very great measure, those of the church of Rome. They deny the supremacy of the pope, and transubstantiation, and exclude from the number of sacraments, confirmation, extreme unction, and marriage. Such are the errors proscribed by the synod of Diamper, held in 1599, by Aleixo de Meneses, archbishop of Goa, in order to unite the Thomæans to the Romish church. However, notwithstanding the temporary success that attended the vigorous exertions of the archbishop, for which he was recompensed after his return to Europe, with the archbishopric of Braga, the viceroyship

of Portugal, and the presidency of the council of state at Madrid, these Christians, oppressed and abused by the Jesuits, relapsed from the church of Rome soon after the death of the archbishop; and notwithstanding the endeavours of Alexander VII. to conciliate them by the mission of four bare-footed Carmelites, they could no more be reduced to submission. At length, when the Dutch took Cochin, in 1663, the Christians of St. Thomas recovered the liberty which they had formerly enjoyed; but they derived little advantage besides from their new masters. Encyclopédie, and Geddes's History of the Church of Malabar and Synod of Diamper, in his Tracts, vol. v. For a further account of this sect, see CHRISTIANS of St. Thomas.

THOMAR, in *Geography*, a town of Portugal, in Estremadura, containing two churches, an hospital, four convents, and about 3600 inhabitants; 63 miles N.E. of Lisbon. N. lat. 39° 34'. W. long. 8° 8'.

THOMAS, surnamed *Didymus*, or the *Twin*, in *Scripture Biography*, one of our Lord's twelve apostles, of whom the evangelist John has given a short account in the 20th chapter of his Gospel. John Chrysostom informs us, that Thomas preached the gospel to the Ethiopians, Parthians, Persians, and Medes, and even, according to tradition, to the Indians, and in the island of Taprobana; and the Christians called after his name in the East, regard him as the founder of their church. See CHRISTIANS of St. Thomas, and THOMEANS.

For an account of the spurious gospel attributed to St. Thomas, we refer to the article GOSPEL.

THOMAS, ANTONY LEONARD, in *Biography*, a distinguished French writer, was born in the diocese of Clermont, in Auvergne, in the year 1732, and designed for the profession of the law; but his attachment to literature induced him to prefer a professorship in the college of Beauvais. His reputation as a man of letters recommended him to the office of confidential secretary to the duke De Praslin, in which he conducted himself with integrity and honour. When he was advised by the duke to become a candidate for a seat in the French Academy, after having five times gained the prize for his compositions, and discovered that he was put forward as a competitor to Marmontel, who was out of favour with persons in power, he refused to be the instrument of such a design. In consequence of this circumstance, the duke dismissed him his office, but procured for him the place of secretary-interpreter for the Swiss Cantons, to which a very inconsiderable salary was annexed; and yet this was the whole benefit which he obtained from court-favour. His career as a writer commenced in 1756, by "Reflections historical and literary on Voltaire's Poem on Natural Religion;" and on all subsequent occasions he proved himself the friend of virtue, and a lover of mankind. His eulogies, particularly those on Des Cartes and Marcus Aurelius, were highly commended. His "Essai sur les Caractères, les Mœurs, et l'Esprit des Femmes," 1772, is a sprightly performance, in which fine writing and philosophical observation are combined. His "Essai sur les Eloges," in 2 vols. 1775, exhibits striking portraits with just ideas. As a poet, he appears to advantage in his "Épître au Peuple," his "Ode sur les Temps," and his "Poème de Jumonville." His epic poem, entitled "Le Pétreide," the hero of which was czar Peter, was left unfinished. He was distinguished by his singularities, and also by his sympathy with persons in distress, for whose relief he submitted to personal inconvenience and privation. His death took place at the seat of the archbishop of Lyons, in September 1785, at the age of 53. His works, in prose and verse, were published at Paris, in 7 vols. 8vo. Gen. Biog.

THOMAS, CHRISTIAN, an Eclectic philosopher of the

German schools, who deserves notice on account of the boldness with which he threw off the yoke of human authority, and the perseverance with which, against much opposition, and in many vicissitudes of fortune, he maintained and exercised the right of free inquiry. He was born at Leipzig in the year 1655, and finished his course of education in the university of his native city. Upon a perusal of Puffendorf's Apology for rejecting the scholastic principles of morals and law, he renounced implicit deference to all ancient dogmas; and engaged in reading lectures on the subject of natural law, first from the text of Grotius, and afterwards from that of Puffendorf, in the full exercise of his own judgment, with prudent caution while his father lived, but after his death, with a boldness which incurred the violent resentment of theologians and professors. In 1687 he published an "Introduction to Puffendorf," in which he deduced the obligation of morality from natural principles, and thus gave great offence. In the following year he became still more unpopular, by commencing a monthly literary journal, entitled "Free Thoughts; or, Monthly Dialogues on various Books, chiefly new," containing a severe attack upon many of his contemporaries. Complaints of the raillery of this satirical work were lodged before the ecclesiastical court of Dresden; and Thomas with difficulty escaped punishment. Some other sarcastical pieces inflamed the resentment of his enemies, and he was charged before the same court by the clergy of Leipzig with a contempt of religion. Soon after he published another satirical work "On the Divine Right of Kings," "A Defence of the Sect of the Pietists," and some other eccentric works of the same general character, for which he was threatened with imprisonment; but obtaining permission from the elector of Brandenburg to retire, he became a voluntary exile from Leipzig: and soon after was appointed public professor of jurisprudence, first in Berlin, and afterwards at Halle. In these situations he indulged his satirical humour, and his inclination for controversy, as long as he lived; persevering in his endeavours to correct and subdue the prejudices of mankind, and to improve the state of philosophy. He died at Halle, in the year 1728. Thomas was the author of several treatises on logic, morals, and jurisprudence, in which he deviates from opinions generally received; and his latter publications are, in many respects, inconsistent with the former. His principal philosophical works are, "An Introduction to Aulic Philosophy; or Outlines of the Art of Thinking and Reasoning," Leips. 1688; "Introduction to Rational Philosophy;" "A Logical Praxis," Hal. 1691; "Introduction to Moral Philosophy," 1692; "A Cure for irregular Passions, and the Doctrine of Self-knowledge," 1696; "The new Art of discovering the secret Thoughts of Men;" "Divine Jurisprudence;" "Foundations of the Law of Nature and Nations;" "Dissertation on the Crime of Magic;" "Essay on the Nature and Essence of Spirit, or Principles of Natural and Moral Science," 1699; and "History of Wisdom and Folly."

As a specimen of the peculiar tenets and maxims of this eccentric philosopher, we shall subjoin the following.

"Thought arises from images impressed upon the brain; and the action of thinking is performed in the whole brain. Brutes are destitute of sensation. Man is a corporeal substance, capable of thinking and moving, or endued with intellect and will. Man does not always think. Truth is the agreement of thought with the nature of things. The senses are not deceitful, but all fallacy is the effect of precipitation and prejudice. From perceptions arise ideas, and their relations; and from these, reasonings. It is impossible to

to discover truth by the syllogistic art. No other rule is necessary in reasoning, than that of following the natural order of investigation; beginning from those things which are best known, and proceeding, by easy steps, to those which are more difficult.

“Perception is a passive affection, produced by some external object, either in the intellectual sense, or in the inclination of the will. Essence is that without which a thing cannot be perceived. God is not perceived by the intellectual sense, but by the inclination of the will: for creatures affect the brain; but God, the heart. All creatures are in God: nothing is exterior to him. Creation is extension produced from nothing by the divine power. Creatures are of two kinds, passive and active; the former is matter; the latter, spirit. Matter is dark and cold, and capable of being acted upon by spirit, which is light, warm, and active. Spirit may subsist without matter, but desires a union with it. All bodies consist of matter and spirit, and have therefore some kind of life. Spirit attracts spirit, and thus sensibly operates upon matter united to spirit. This attraction in man is called love; in other bodies, sympathy. A finite spirit may be considered as a limited sphere in which rays, luminous, warm, and active, flow from a centre. Spirit is the region of the body to which it is united. The region of finite spirits is God. The human soul is a ray from the divine nature; whence it desires union with God, who is love. Since the essence of spirit consists in action, and of body in passion, spirit may exist without thought: of this kind are light, ether, and other active principles in nature.

“Good consists in the harmony of other things with man and his several powers. The highest felicity of man consists in tranquil delight. The fountain of this delight is the rational love of man and of God. Internal love and reverence are all the homage which nature teaches us to pay to God. With respect to God, the two capital errors are atheism and superstition. Superstition is worse than atheism. The love of God is a supernatural affection, which prepares the soul for future felicity. The rational love of man comprehends all social virtues. Rational self-love includes self-preservation, temperance, purity, industry, fortitude. To wise men, virtue is its own reward. Laws are appointed for the sake of fools, to conduct them to internal tranquillity, and external peace. Of fools, there are three classes; those who disturb external peace; those who do nothing to promote it; and those who do not enjoy internal peace. The first have need of authority; the second of authority and counsel; the third of counsel alone. The obligation of authority and law extends only to external actions, which are just when they are conformable to law: justice is therefore to be distinguished from virtue, which respects the internal man, and requires a conformity to the law of nature.” Brucker by Enfield, vol. ii.

THOMAS. *Christians of St. Thomas.* See THOMÉANS.

THOMAS'S HOSPITAL. See HOSPITAL.

THOMAS, *St.*, in *Geography*, an island of the Atlantic, near the coast of Guinea, situated on the equinoctial line, of a circular form, about ten leagues in circumference, discovered by the Portuguese in the year 1640. The climate is insalubrious, and at some seasons of the year the sky is even darkened by thick fogs, which are dispersed by the winds that blow in the months of July and August. In this island the inhabitants have two winters, like those of other places that are under the same parallel, but without the cold that distinguishes that season in Europe. The rains continue from December to February; and spring begins with our summer, in the month of May. During the first three months of this period, the

heat is insupportable, and the first settlers gradually inured themselves to the climate. The soil on this island is viscous and clayey, and mixed with chalk; but it is rendered fertile by the heavy night dews. The plants and shrubs, which it rapidly produces, are burnt to ashes, and applied as the most beneficial manure to sugar-canes; which were first planted here by the Portuguese: in their endeavours to cultivate which they have been disappointed. Rice and millet succeed, and vines of the richest kind, as well as melons, cucumbers, figs, ginger, and all sorts of roots, pulse, and pot-herbs, are cheaply reared, and they arrive at the utmost perfection. Yams are in this island a very wholesome and delicious diet. The land of this island is well watered, and much fertilized by its rivers and streams. In the centre is a high mountain, covered with wood and fruit-trees, whose summit is nevertheless always covered with snow. Its quadrupeds, birds, and fishes, are very various, and abundant; and St. Thomas would be equal to any spot in the globe, if its temperature corresponded to its other qualities. The inhabitants are the descendants of the Portuguese first settlers and the negroes, who are retained in the service of Europeans, and such as prefer a residence here to Angola. They are for the most part Roman Catholics, and extremely ignorant, superstitious, and bigotted. The ecclesiastical government is under the direction of the bishop, who is a suffragan of the archbishop of Lisbon. E. long. 8° 6'.—Also, a town of Hindoostan, on the coast of Coromandel. Here was formerly a powerful city, called “Meliapour,” or “Meilabour,” the capital of the kingdom of Coromandel; but on the ruins of this city the Portuguese erected the stately city of St. Thomas. This is inhabited chiefly by weavers and dyers, who manufacture the best coloured stuffs in India. The Portuguese, who rebuilt this place in 1545, have raised it from a state of desolation to a flourishing state, both with regard to its buildings and inhabitants. Whilst the Portuguese retained it, it was a bishopric under the archbishop of Goa; and they had several churches, besides monasteries, and a college for the instruction of the Portuguese and Malabar children. Here is also the famous church of St. Thomas the Apostle, where it is pretended that he was buried. (See THOMÉANS, and CHRISTIANS of *St. Thomas.*) The city had seven gates, and was, on account of its situation, guarded by the sea on one side, and a chain of mountains on the other, very strong: nevertheless it was taken by the Moors after a long siege, and retained in their possession.—Also, a town of Germany, in the archduchy of Austria; 6 miles N.W. of Grein.—Also, a town of Savoy, in the county of Maurienne; 3 miles N. of Monstier.—Also, the principal of the Virgin Islands, in the West Indies, about six leagues in circumference, belonging to the Danes. It abounds with potatoes, millet, manioc, and most sorts of fruits and herbage, and especially sugar and tobacco, but is much exposed to the attacks of mosquitos and other vermin. The English had formerly a spacious settlement in this island; and here is a safe and commodious harbour, with two natural mounds upon it, fitted for the reception of two batteries to guard its entrance. Nearly in the centre of the harbour is a small fort; and about 50 or 60 paces W. of it is the town, consisting chiefly of one long street, at the end of which is the Danish factory, with convenient warehouses. On the right side of this factory is the Brandenburg quarter, containing two small streets, full of French refugees from Europe and the islands. Most of the houses are built of brick, and one story high. The trade of this small island is considerable, particularly in time of peace; as it is the staple for such articles of traffic as the French, English, Dutch, and Spaniards are not allowed to deal in publicly in their own islands; and

in war, their privateers bring their prizes hither for sale. N. lat.  $18^{\circ} 22'$ . W. long.  $64^{\circ} 50'$ .—Also, the capital of Spanish Guiana, called “San Tomé,” which is situated at the foot of a small mountain on the right bank of the Orinoko. For its defence, a fort is placed opposite to the city and on the left bank of the river; it is surrounded by a number of houses, dependent, like the fort, on the province of Guiana. They call this place Port Raphael; and it is here the communication between Guiana and the provinces of Venezuela and Comana is found. Between Port Raphael and the city is seen the island called “Del Medio,” or the Middle, because it is in the middle of the river. It is a rock, which, in its southern part, discovers itself in summer, and is under water in floods. The principal channel is between the city and this island: when the water is low it has 200 feet, and on the increase of the river 50 or 60 more.—Also, a town of the United States of America, in South Carolina; 21 miles N. of Charlestown.—Also, a town of the island of Cuba; 130 miles W.S.W. of Havannah.

THOMAS *de Castile, St.*, a town of North America, in the government of Mexico, and province of Guatemala.

THOMAS'S *Bay*, a bay on the W. coast of Antigua.

THOMAS'S *Creek*, a river of South Carolina, which runs into the Great Pedee.

THOMAS'S *Gulf, St.*, a bay of the Atlantic, on the W. coast of Africa. S. lat.  $24^{\circ} 50'$ .

THOMAS'S *Head, St.*, a cape of England, on the N.W. coast of the county of Somerset, at the mouth of the Severn. N. lat.  $51^{\circ} 20'$ . W. long.  $73^{\circ} 35'$ .

THOMAS'S *Hospital*. See HOSPITAL.

THOMASBRUCK, in *Geography*. See THAMSBRUCK.

THOMASIUS, JACOBUS, in *Biography*, a writer in history and philosophy, professor of eloquence in the university of Leipzig, and chiefly distinguished as the preceptor of the illustrious Leibnitz, was born at Leipzig in the year 1622. Having obtained distinction by his lectures and public theses in his native city, he was advanced to the office of co-rector, first of the college of St. Nicholas, and afterwards of that of St. Thomas. His erudition was extensive, nor was he less distinguished by his modesty and by his disinclination to controversy. Among his numerous works, the principal are “Antiquities of Philosophical and Ecclesiastical History;” “Dissertations on the Stoical Philosophy, and on other Subjects relating to the History of Philosophy;” and “A Dissertation on Literary Plagiarism, with a List of 100 Plagiarists,” all in Latin. He died in the year 1684. Brucker. Moreri.

THOMASIUS, CHRISTIAN, son of the preceding, an eminent jurist, was born at Leipzig in 1655. Having studied the law at Francfort on the Oder, he was made a doctor in that faculty in 1679; and returning to his native city, he attended the bar, and wrote some treatises on the law. He was the friend of Puffendorf. By opposing the scholastic philosophy in a German journal, commenced in 1688, he excited opposition, and raised against himself many enemies. Many circumstances occurred which increased the number of his adversaries, and at length he was denounced to the court of Dresden as a heretic and Calvinist. The dread of persecution induced him to withdraw to Berlin, and the king of Prussia offered him an asylum at Halle, where he intended to found an university. In this institution he occupied the second chair of law, and on the death of Stryckius, in 1710, he was advanced to the first chair. In 1713 he defended concubinage, and being denounced for this opinion by the theological faculty of Halle, orders were issued for proceeding against him criminally. But upon the examination of his

theses, by commissioners, the proceedings against him were stopped. The dispute, however, continued; nevertheless he rose to the post of privy-counsellor to the king, and director of the university of Halle, and died in 1728. Mosheim has given this character of Thomasius. “His views were vast; he aimed at the reformation of philosophy in general, and of the Peripatetic system in particular; and he assiduously employed both the power of exhortation and the influence of example, in order to persuade the Saxons to reject the Aristotelian system, which he had never read, and which most certainly he did not understand. The scheme of philosophy which he substituted in its place was received with little applause, and soon sunk into oblivion; but his attempt to overturn the system of the Peripatetics, and to restore the freedom of philosophical inquiry, was attended with remarkable success, made in a little time the most rapid progress, and produced such admirable effects, that Thomasius is looked upon, to this day, as the chief of those bold spirits who pulled down philosophical tyranny from its throne in Germany, and gave a mortal blow to what was called the Sectarian philosophy in that country.” Mosheim's *Ecl. Hist.* Moreri.

THOMASSIN, LOUIS, an ecclesiastical writer, was born at Aix, in Provence, in 1619, and was admitted into the congregation of the Oratory in the fourteenth year of his age. He afterwards became professor of theology at Saumur, and laying aside scholastic subtleties, adopted the method of teaching by the scriptures, fathers, and councils: and in 1654 he was called to the seminary of St. Magloire at Paris. His “Latin Dissertations on the Councils,” were published by the desire of the archbishop of Paris, of which the first and only volume appeared in 1667, 4to. In the following year he published “Memoires sur la Grace,” 3 vols, 8vo., in which work he attempts to conciliate the Greek fathers with St. Augustine. This was reprinted in 1682, with the addition of two memoirs. In 1678 he published the first volume of a work, entitled “De la Discipline Ecclesiastique,” which was followed by a second volume in 1679, and a third in 1681. This work was translated into Latin, in 3 vols. fol. from respect to pope Innocent XI. and for the advantage of more unlimited circulation. His other works, which we can merely enumerate, were “Dogmata Theologica,” 3 vols. 1680–89; “The Discipline of the Church and Christian Morality;” “On the Divine Service;” “On Festivals;” “On Fasts;” “On Truth and Falshood;” “On the Unity of the Church;” “On Alms, Trade, and Usury;” “Methode d'enseigner chretienement la Grammaire, ou les Langues par rapport a l'Ecriture Sainte,” 2 vols. 8vo.; and “Glossaire universelle Hebraique,” which latter appeared after his death in 1697, folio.

Thomassin died in the year 1695, having for some time enjoyed a pension of 1000 livres granted to him by the French clergy, and of which he gave one half to the poor. One of his biographers characterises him as “humble, modest, and mild, fond of study and retirement, and shunning disputes.”—Although his reading was extensive, his erudition was not of the highest class, and it is said that his work on Discipline contains many mistakes where Greek authors are cited. Moreri. *Gen. Biog.*

THOMASTOWN, in *Geography*, a post-town of the county of Kilkenny, Ireland, situate on the river Nore, over which it has a fine bridge. The castle was built about 1180, by Thomas Fitzanthony, from whom the town takes its Irish name of *Bally-mac-Andau*; i. e. town of Anthony. It was a borough, and sent two members to parliament, but lost that privilege by the Union. The Nore is navigable to this town  
for

for small vessels. It is 59 miles S.S.W. from Dublin, and 15½ N. from Waterford.

**THOMASTOWN**, a post-town of the United States, in the district of Maine, and county of Lincoln, containing 2100 inhabitants.

**THOMISM**, or **THOMASISM**, the doctrine of St. Thomas Aquinas, and his followers the Thomists, chiefly with regard to predestination and grace. See his biographical article.

There is some doubt what the true, genuine Thomism is: the Dominicans pretend to hold pure Thomism; but there are other authors who distinguish the Thomism of St. Thomas from that of the Dominicans.

Others, again, make Thomism no other than a kind of Jansenism disguised; but Jansenism, we know, has been condemned by the popes, which pure Thomism never was.

In effect, the writings of Alvarez and Lemos, who were appointed, by their order, to lay down and defend before the holy see, the dogmata of their school, have since been reputed the rule of pure Thomism.

Those two authors distinguish four classes of Thomists: the first, which they reject, destroys or takes away liberty; the second and third do not differ from Molina. The last, which Alvarez embraces, admits a physical premotion, or predetermination, which is a complement of the active power, by which it passes from the first act to the second; that is, from complete and next power to action.

This premotion, they hold, is offered in sufficient grace: sufficient grace is given to all men; and that they have a complete, independent, next power not to act, and even to reject the most efficacious grace.

**THOMISTS**, a sect of school divines, who maintain Thomism.

The avowed antagonists of the Thomists are the Scotists.

**THOMITES**. See **THOMÆANS**.

**THOMMDAMM**, in *Geography*, a town of the duchy of Saxe Lauenburg, on the Elbe; 25 miles S.E. of Lauenburg.

**THOMPSON**, *Sir BENJAMIN*, *Count of Rumford*, in *Biography*, distinguished by his assiduity and zeal in the promotion of science, and in devising and executing schemes of public utility, was born at the village of Rumford, in New England, in the year 1752; and with the assistance afforded him by a professor of natural philosophy in the American university of Cambridge, acquired in early life such a degree of knowledge as enabled him to give instruction to others. By an advantageous marriage, while he was young, his advancement was accelerated, so that he obtained the rank of a major in the militia of his native district. When the war broke out between the mother-country and her colonies, he took part with the former, and by means of his local knowledge, he rendered himself useful to the British generals in America. In process of time he repaired to England, and recommending himself to lord George Germaine, the chief minister in the American department, he obtained a place in his office. Towards the close of the war, the same nobleman, with a view of securing for him a permanent provision, sent him to New York, where he raised a regiment of dragoons, and by being appointed lieutenant-colonel, became entitled to half-pay. Upon his return to England, his majesty, in 1784, conferred upon him the honour of knighthood; and for some time he occupied the post of one of the under-secretaries of state. Soon after he made a tour to the continent, and being warmly recommended by the prince of Deux-Ponts, afterward king of Bavaria, to his relation the reigning elector-palatine, and duke of Bavaria, he was admitted into his service, and occupied an eminent station. He had thus an opportunity of effecting many important and

useful reforms in the departments of the state, both civil and military. His attention was at this time particularly directed to the suppression of mendicity, which prevailed not only at Munich, the capital, but through the whole country, to an extent that rendered the restraint and abolition of it a very difficult and hazardous undertaking. With this view he formed a plan for employing all mendicants; and having provided a building for their reception, and materials for their labour, he sallied forth into the streets of the city on the 1st of January 1790 (New-year's day being set apart for giving alms in Bavaria), accompanied by the field-officers of the garrison and the magistrates of the city; and arresting with his own hand the first beggar that came in his way, his attendants followed his example, so that before night not a single beggar was to be seen in the whole metropolis. Those that were arrested were conducted to the town-hall, where their names were inscribed, and then ordered to repair to the work-house, where they would find employment, and a sufficiency of wholesome food. In consequence of these prompt and vigorous measures, the evil was redressed, and the mendicants were led by habit to prefer industry to idleness, and decency to the filth, rags, and squalid wretchedness attendant on beggary. He also introduced into Bavaria the culture and use of potatoes. For all these services sir Benjamin was decorated by the Bavarian sovereign with several orders, promoted to the rank of lieutenant-general, and created a count by the title of his native place, Rumford. During his abode at Munich, he commenced his experiments upon the improvement of fire-places, with respect to the economy of fuel, and the convenience of cooking; and also his plans for a cheaper and more nutritive mode of feeding the poor, which gave him peculiar celebrity. Having quitted Bavaria in 1799, he resided for some time in this country, pursuing a variety of experiments on the nature and application of heat, and the construction of chimneys, grates, and fire-places. He also promoted science both by his own researches and experiments, and by liberally exciting emulation in others, upon a more enlarged plan. For the latter purpose, he transferred, on an occasional visit to this country in 1796, to the Royal Society of London, of which he was a member, 1000*l.* 3 *per cent.* stock, the interest of which was to be applied every second year as a premium to the author of the most important discovery on the subjects of heat and light in any part of Europe during the two preceding years; the preference to be always given to such discoveries as, in the opinion of the president and council, tend most to the benefit of mankind; which indeed was the leading object of all his researches. He also suggested the plan, and assisted in the formation of the Royal Institution, which has produced several other establishments of a similar nature.

In the year 1802 he left England for Paris, which became his fixed residence, and where he married the widow of the celebrated chemist, Lavoisier; but this connection proving unhappy, it was soon terminated by a separation. The count afterwards retired to a country-house at Auteuil, about four miles from Paris, which he rendered a delightful habitation. Besides the improvement of his grounds, in which he took great pleasure, he pursued a variety of philosophical and mechanical researches. With his superior talents he combined certain peculiarities, and a tenaciousness, not to call it obstinacy, of temper, which prevented his enjoying the pleasures of social intercourse. Although he disapproved both the character and politics of the French, he preferred their climate to every other; and he obtained permission from the king of Bavaria to continue in France, and to enjoy his pension of 1200*l.* a-year. He lived in a state of retirement, and also in a course of abstemiousness,

which debilitated his constitution, and rendered it incapable of resisting an attack of low fever, by which he was carried off in August 1814, in his 63d year. By his first wife he had one daughter, now resident at Boston.

Although count Rumford was not a learned man, he acquired by his knowledge of the French and German languages, and by his extensive acquaintance, and frequent conversation with literary men, a large stock of literature and science. His peculiar talent was that of contriving instruments, and devising experiments for facilitating his researches in those branches of economics and scientific philosophy to which his attention was directed. He was also distinguished by a steadiness and perseverance of pursuit, which were favourable to his attainment of the objects which he had in view. As to his person, his stature was above the middle size, his countenance was dignified and pleasing, and his manner and tone of voice mild and gentle. He was, nevertheless, ambitious of distinction, and too prone to dictate in transactions with regard to which other persons were jointly concerned with himself. The papers which he communicated both to the Royal Society and French Institute, and which are published in their Transactions and Memoirs, are numerous. The only separate publication of count Rumford was a series of "Essays, Experimental, Political, Economical, and Philosophical," commencing with the year 1796, and continued to 18 in number, and occupying 4 vols. 8vo. *Cent. Mag.* for October 1814.

THOMPSON, in *Geography*, a town of America, in the state of New York, the capital of Sullivan county; bounded N. by Wawarsing and Neverfink, E. by Mamakating, S. by Deerpark in Orange county, and W. by the Mongaup, which separates it from Lumberland, Bethel, and Liberty. Its length N. and S. is about 34 miles, and breadth 12. The principal settlements are Thompson, Monticello, Bridgeville, and Concord. The whole area of Thompson is 139,500 acres; and the population by the census of 1810, consisted of 1290 persons. The principal streams are the Neverfink, Mongaup, and Sheldrake.—Also, a township of Connecticut, in the county of Windham; 20 miles N.N.E. of Windham: the place contains 2467 inhabitants.

THOMPSON'S *Creek*, a river of South Carolina, which runs into the Atlantic, N. lat. 34° 44'. W. long. 79° 46'.—Also, a river of West Florida, which runs into the Mississippi, N. lat. 30° 59'. W. long. 91° 30'.

THOMPSON'S *Harbour*, a harbour in Hudson's Bay. N. lat. 60° 20'. W. long. 78°.

THOMPSON'S *Island*, a small island of Upper Canada, at the entrance of the river St. Claire.

THOMPSONSBOROUGH, a town of America, in the district of Maine; 30 miles N.E. of Portland.

THOMSI, a town of Hungary; 11 miles S.W. of Canischa.

THOMSON, JAMES, in *Biography*, a popular English poet, was born at Ednam, near Kelso, in Scotland, in the year 1700, being one of the nine children of the minister of that place. Whilst he was at school at Jedburgh, he manifested no powers superior to those of other boys, except in a taste for poetry, which he betimes indulged, and which introduced him, during his vacations, to the society of some neighbouring gentlemen. Of his productions, however, he thought so humbly, that on New-year's day he committed to the flames those of each preceding year. From Jedburgh he was removed to the university of Edinburgh, where he persevered in the cultivation and exercise of his poetical talents; but upon the death of his father, he complied with the wishes of his friends by entering on a course of divinity. His probationary exercise was the explanation

of a psalm, which was written in a style so splendid, as to incur reproof from the theological professor, as being altogether unsuitable to the audience which might probably attend his future ministry. Having no great inclination for the office, this admonition induced him to devote himself entirely to poetry: and after spending some time as private tutor in the family of lord Binning, he determined, at the suggestion of a lady, who was his mother's friend, to try his fortune in London. In 1725 he came to London, and meeting with his college acquaintance Mallet, he shewed him his poem of "Winter," in an imperfect state; who advised him to finish and publish it. Mr. Millar, a well-known London bookseller, bought it for a small sum, and published it in 1726. At first it attracted little attention; but Mr. Whateley, a gentleman of acknowledged taste, giving a favourable account of it, brought the poem and its author into notice. The author was introduced to Pope, and recommended by bishop Rundle to lord chancellor Talbot. In 1727 he published his "Summer," and in the same year "A Poem sacred to the Memory of Sir Isaac Newton," just deceased, and also his "Britannia." His "Spring" was published in 1728; and in 1730 the Seasons were completed by "Autumn," and published collectively. In 1728 Thomson, aspiring to the popularity and emolument of dramatic composition, succeeded in introducing upon the stage of Drury-lane his tragedy of "Sophoniba." Its reception, however, was not very flattering. Soon after he was appointed, by the recommendation of Dr. Rundle, travelling companion to the Hon. Mr. Talbot, the eldest son of the chancellor, and had an opportunity of visiting most of the courts and countries of the European continent. During this tour, the idea of his poem on "Liberty" was suggested to him, and he employed two years in completing it. In consequence of this excursion, he obtained, by the interest of Mr. Talbot, the place of secretary of the briefs, which, being almost a sinecure, afforded him leisure for his private literary pursuits. His poem on "Liberty" was more coolly received than the nature of the subject led him to expect. When lord Hardwick succeeded the lord chancellor Talbot, Thomson lost his place; but upon being questioned by the prince of Wales, to whom he was introduced, by Mr. (afterwards lord) Lyttelton, as to his circumstances, a pension of 100*l.* a year was granted to him.

Upon the introduction of his second tragedy, "Agamemnon," to Drury-lane, in 1738, he was so anxious concerning its success, that he is said to have been thrown into a copious perspiration. His "Edward and Eleonora" was prevented from appearing by the interference of the lord chamberlain. The "Masque of Alfred," performed before the prince at Cliefden-house, in 1740, was the joint production of himself and Mallet; and in this piece was introduced the famous song of "Rule Britannia," the production of one or other of these two persons. The most successful of Thomson's dramatic pieces was his "Tancred and Sigismunda," which appeared at Drury-lane in 1745; but his "crowning performance," as one of his biographers calls it, was "The Castle of Indolence," published in 1746. Our poet was now rendered independent by the interest of Mr. Lyttelton, who obtained for him the office of surveyor-general of the Leeward islands, which, after payment of a deputy, yielded him about 300*l.* a year. Death, however, in consequence of a fever occasioned by a cold, deprived him, in August 1748, of the comparative affluence derived from this appointment. His remains were interred in Richmond church, without any memorial; but in 1762 a monument was erected in Westminster Abbey, the expence of which was defrayed out of the profits of an edition of his works, published by Mr

Mr. Millar. His "Coriolanus" was brought on the stage by his executors, in 1749, for the benefit of the surviving branches of his family. The prologue, composed by Lyttelton, was very feelingly delivered by Quin, the intimate friend of Thomson.

Thomson's person was large and awkward, and his countenance unanimated; nor did his appearance or manners indicate genius or refinement. With select friends, however, he was easy and cheerful, and universally beloved for the kindness of his heart, and freedom from those passions that sometimes disgrace men of literary character. He was indolent and self-indulgent in his habits; although "no poet," as his biographer says, "has deserved more praise for the moral tenor of his writings. Unbounded philanthropy, enlarged ideas of the dignity of man, and of his rights, love of virtue, public and private, and a devotional spirit, narrowed by no views of sect or party, give soul to his verse when not merely descriptive; but no one can rise from the perusal of his pages without melioration of his principles or feelings." His poetical merit is most conspicuous in his "Seasons," and though Dr. Johnson charges it with a defect of method, yet as a history of the year through its changes, depending upon the vicissitude of the seasons, it adheres sufficiently to its general plan for preserving a continuity of subject, with due allowances for the moral and philosophical digressions by which it is varied. Its diction, though somewhat laboured, is energetic and expressive. Its verification, though it does not indicate a nice ear, is seldom unpleasantly harsh. Upon the whole, continues the biographer now cited, "scarcely any poem has been more, and more deservedly, popular; and it has exerted a powerful influence upon public taste, not only in this country, but throughout Europe. Thomson's other pieces in blank verse display a vivid imagination, a comprehensive understanding, and exalted sentiments, but are not marked with any peculiar character. The addition to his fame as a poet has principally arisen from his "Castle of Indolence," an allegorical composition in the manner of Spenser." Of his tragedies, the best that can be said is that they maintain a respectable rank among the productions of the modern school of the drama, which, when they disappear from the stage, are seldom taken up in the closet. Murdoch's Life of Thomson. Johnson's Lives of the Poets. Gen. Biog.

THONE, in *Geography*. See TONE.

THONE, in *Agriculture*, a term signifying somewhat damp and cold, not thoroughly dry. Also flaxid or limber, as undried hay, corn, or straw in a moist state.

THONGTONG, in *Geography*, a town of the Birman empire; 10 miles N.W. of Raynaangong.

THONNA, a town of Saxony, in the principality of Gotha; 12 miles from Gotha.

THONNAUSTAUFF, a town of Bavaria, near the Danube; 3 miles from Ratibon.

THONNES, or THONNEX, a town of France, in the department of the Leman; 9 miles S.E. of Annecy.

THONON, or TONOX, a town of France, in the department of the Leman, late capital of the duchy of Chablais, on the lake of Geneva, situated on a plain a little elevated. It is not environed with walls, but was formerly defended by a strong castle, surrounded with lofty towers, where Amadeus VIII. and IX. and Louis, dukes of Savoy, resided for some time. The castle was burned and demolished, in the 16th century, by the Bernois. It has one parish church and several convents; 18 miles N.E. of Geneva. N. lat. 46° 18'. E. long. 6° 32'.

THOPH. See MACHUL and SISTRUM.

THOPHAIL, ABU GIAFAR, in *Biography*, a cele-

brated Peripatetic philosopher and physician, was a native of Seville in Spain, and preceptor to Maimonides and Averrões. This philosopher employed the Aristotelian doctrine to the purposes of enthusiasm, in the elegant tale still extant of "Hai Ebr Yockdan;" a youth who, having been exposed when an infant on the sea-coast, was nourished by a hind, and grew up in the woods, without any intercourse with human beings; and who, by the unaided exertions of his own powers, attained to the knowledge of things natural and supernatural, and arrived at the felicity of an intuitive intercourse with the divine mind. This piece is written with such elegance of language and vigour of imagination, that, notwithstanding the improbability of the story, it has been universally admired. It exhibits a favourable specimen of Peripatetic philosophy, as it was taught among the Saracens; and, at the same time, affords a memorable example of the unnatural alliance, which was now so generally established between philosophy and fanaticism. This work was translated by Edward Pococke, jun. from the Arabic into Latin, under the title of "Philosophus Autodidactus," and printed in 4to. at Oxford, in 1700. It was also translated into English by S. Hoadley, professor of Arabic in Cambridge, ed. Lond. 1711, 8vo., and also into Dutch. Thophaïl is said to have written several other works, and died at Seville in 1175. Brucker by Enfield. Gen. Biog.

THOR, in *Mythology*, a deity worshipped by the ancient inhabitants of the northern nations; particularly by the ancient Scandinavians and Celts. Julius Cæsar (Com. lib. vi. c. 17.) speaks of a god of the Gauls, who was charged with the conduct of the atmosphere, and presided over the winds and tempests, under the name of Jupiter: but Lucan gives him a name, which bears a greater resemblance to that of Thor, viz. *Taranis*, a word which, to this day, in the Welsh language, signifies *thunder*. The authority of this deity extended over the winds and seasons, and particularly over thunder and lightning. In the system of the primitive religion, the god Thor was probably one of those genii, or subaltern deities, sprung from the union of Odin, or the Supreme Being, and the Earth. The Edda calls him the most valiant of the sons of Odin; and in the Icelandic mythology, he is considered as the defender and avenger of the gods. He always carried a mace, or club, which as often as he discharged it returned to his hand of itself; he grasped it with gauntlets of iron, and was possessed of a girdle which had the virtue to renew his strength as often as was needful. With these formidable arms he overthrew the monsters and giants, when the gods sent him to oppose their enemies. Thor, Friga, or Freya, and Odin, composed the court or supreme council of the gods, and were the principal objects of the worship and veneration of all the Scandinavians. The Danes seem to have paid the highest honour to Odin. The inhabitants of Norway and Iceland appear to have been under the immediate protection of Thor: and the Swedes chose for their tutelary deity Freya, or Frey, an inferior divinity, who, according to the Edda, presided over the seasons of the year, and bestowed peace, fertility, and riches.

There was a day consecrated to Thor, which still retains his name in the Danish, Swedish, English, and Low Dutch languages, viz. *Thursday*. This word has been rendered into Latin by *dies Jovis*, or *Jupiter's day*; for this deity, according to the ideas of the Romans, was the god of thunder. Mallet's North. Ant. vol. i. p. 95.

THOR, *Le*, in *Geography*, a town of France, in the department of the Mouths of the Rhone; 9 miles E. of Avignon.

THORA, a town of Hindoostan, in the circar of Rantampour; 45 miles S. of Rantampour.

THORA,

THORA, in *Botany*. See ACONITUM.

THORACIC, in *Anatomy*, an epithet applied to various parts in and about the chest, as to the aorta above the diaphragm, and to some branches of the axillary artery (see ARTERY); to some branches of the axillary plexus of nerves (see NERVE); to the trunk of the absorbing system of vessels. See ABSORBENTS.

THORACICI, in the *Linnæan System of Ichthyology*, the name of the third order of bony fishes, respiring by means of gills only: the character of which is, that the bronchia are ossiculated, and the ventral fins are placed underneath the thorax. This order in Gmelin's edition of the Linnæan system, includes nineteen genera, and a good number of species. The genera are, the *cepola*, *echencis*, *coryphæna*, *gobius*, *cottus*, *scorpena*, *zeus*, *pleuronectes*, *chatodon*, *sparus*, *scarus*, *labrus*, *sciæna*, *perca*, *gasterosteus*, *scomber*, *centrogaster*, *mullus*, and *trigla*.

THORÆ RADIX, in the *Materia Medica*, the name of a root which keeps its place in the catalogues of officinal simples, but is seldom used. See ACONITUM and ANTHORA.

The plant which produces it is the *thora valdensis* of Gerarde. It is kept in the gardens of the curious, but grows wild in the mountainous parts of Germany. The root is composed of a number of granules or small lumps, like that of the common ranunculus; the leaves are roundish, and stand on small pedicles, and the stalks are about six inches high, and the flowers yellow, and like those of our common wild ranunculuses.

The root is acrid and corrosive, and the juice of the leaves is said to poison animals, and to have been used by the ancients for that purpose.

THORAME, in *Geography*, a town of France, in the department of the Lower Alps; 13 miles E. of Digne.

THORAX, in *Anatomy*, that division of the skeleton which contains the bones forming the cavity of the chest; or it is used to denote the cavity of the chest. See LUNG, where the bones and their articulations are described, as well as the cavity they form, and its contents.

THORAX. For an account of the operation of tapping, refer to EMPYEMA, PARACENTESIS, and WOUNDS of the Thorax.

The subject of wounds of the chest will be found in the article WOUNDS.

THORDO, DIACONUS or LEGIFER, in *Biography*, descended from an ancient family, was provincial judge in North Jutland, and flourished in the time of Waldemar III., or about the year 1350. He was the author of the following work; "Constitutio Voldemari Regis, per Thordonem Legiferum, &c." Ripis, 1504, et Havn. 1508, 4to.; translated into Latin together with Waldemar's Jutland Laws, and afterwards published in Ludewig's "Reliquiæ MSS." tom. xii. and also in German by Eric Krabbe, in "Westphal's Monuments." Gen. Biog.

THORÐSEN, or THEODORISTURLA, called also *Frode* or *Polyhistor*, was born in Iceland, about the beginning of the 13th century. His father was Thordur Sturleson, brother to the celebrated Snorro. (See STURLESON.) He is represented to be one of the greatest Icelandic poets of his time, as well as an eminent lawyer and historian. His talents excited enemies, so that he was forcibly carried away from the island in 1263, and conveyed to Norway, where he was favourably received by the king Magnus Lagebæter, admitted into his council, and appointed his historian and daphner, one of the highest offices at the Norwegian court. Afterwards, however, he returned to Iceland, and having been chief justice of the country for many years, died in

1284. His works are "Landnama Saga," or "Liber Originum Islandiæ," published entire by bishop Thordur Thorlakfen, Skalholt, 1688, 4to., and by J. Finnæus, Havn. 1774, 4to.:—A continuation of "Sturlunga Saga," or the history of the Sturla family, and almost the whole of Iceland, during his time, which was begun by the learned bishop Brand:—"The History of King Haager Haagenfen," published at the expence of the crown-prince Frederic:—"The History of King Magnus Lagebæter," compiled from the public records of the kingdom, the greater part of which has been lost. Gen. Biog.

THORESBY, RALPH, an eminent antiquary, the son of a considerable merchant of an ancient family at Leeds, where he was born in the year 1658. His father belonged to the body of Presbyterians, and being addicted to antiquarian studies, founded the collection entitled "Museum Thoresbianum." The subject of this article was intended for a mercantile profession, and in order to complete his education, begun at Leeds, and prosecuted in London, he was sent, in his twentieth year, to Rotterdam, to acquire the Dutch and French languages. But his father dying in 1679, he succeeded him in business, married, and settled in his native town. To antiquarian researches, for which his father's example had given him an early taste, he devoted much time and attention. In the earlier period of his life he had been an occasional conformist, in common with many of those who were called Dissenters, and disgusted by the indiscreet zeal of his pastor in maturer life, as well as probably influenced by his diocesan, archbishop Sharp, he joined in full communion with the established church. His connection and correspondence with persons engaged in similar pursuits with his own were gradually enlarged: and upon communicating, by Dr. Martin Lister, an account of some Roman antiquities discovered in Yorkshire, to the Royal Society, he was admitted a member of that learned body in 1697. In 1714 he published a work in which he had been long engaged, containing a history of his native town, and entitled "Ducatus Leodenfis; or the Topography of Leedes, and Parts adjacent," together with a catalogue of the antiquities, &c. contained in the Museum Thoresbianum. An historical part, to which he often refers, and comprehending a view of the state of the northern districts of this kingdom in remote ages, was left in MS. continued to the sixth century; which MS. being communicated to the editors of the Biographia Britannica, was by them printed entire in the article "Thoresby." He published also "Vicaria Leodenfis, or the History of the Church of Leedes," Lond. 1724, comprehending observations on the origin of parochial churches, and the ancient manner of building them, together with biographical memoirs of several clergymen. In the following year he was seized with a paralytic affection, which terminated his life at the age of sixty-eight years. Possessing an extensive acquaintance with the history of his country, genealogy and heraldry, and ancient coins and medals, he always manifested a disposition to assist those who were engaged in works of the antiquarian and biographical description. The sentiments of Mr. Thoresby were liberal and Catholic; his manners regular, and his discharge of social and religious duties exemplary. Biog. Brit.

THORIGNY, in *Geography*, a town of France, in the department of the Channel; 6 miles S.S.E. of St. Lo.—Also, a town of France, in the department of the Yonne; 18 miles S.S.E. of Provins.

THORLASKEN GUÐBRAND, in *Biography*, an Icelandic writer and prelate, was born at Stadarbakke, in the district of Holum, in 1542. In 1561 he was sent to the university of Copenhagen; in 1564 he became rector of the school

school of Holum; and in 1570 he was appointed bishop of that diocese. With a view of diffusing knowledge, he established a printing-press, first at Ruputel, and afterwards at Holum, which he personally superintended. He was one of the most learned of the Icelandic bishops, but too arbitrary in the exercise of his episcopal functions. He died in 1629, in the 85th year of his age. Many considerable works, partly his own, and partly those of others, issued from his press. He also constructed a map of Iceland, which was engraved by Ortelius. Gen. Biog.

THORN, in *Geography*, a city of Prussia, situated on the Vistula, formerly the chief city of Polish Prussia. It was founded by Herman Balck, first grand-master of the Teutonic order, who built the castle of Thorn in 1231. In the following year, the foundation of the town was laid; but the building was discontinued in 1235, on account of the inconvenient situation, and Thorn was built about a German mile farther up the river, on the spot where it now stands. It is supposed to have been called Thorn, because the knights of the Teutonic order, by building this city, opened themselves a *thor* or door into Prussia. When the knights of the Teutonic order enormously abused their power throughout all Prussia, Thorn was the first city which formed the noble scheme of shaking off their oppressive yoke. The inhabitants then put themselves under the protection of Casimir the Great, king of Poland, upon advantageous conditions, as a free city. Thorn has ten gates, and is divided into the Old and the New Town, each of which had formerly its respective council, magistracy, and police. But, in 1454, they were incorporated into one city. They are, however, separated from each other by a wall and moat within the town; and without, they are defended in common by a fine double wall and moats. Thorn was formerly strongly fortified; and it gradually improved its advantageous situation, so as to become a place of very considerable trade, and one of the principal of the Hanse towns. It likewise carried on an extensive commerce in the Baltic, independently of the other cities of that confederacy; for before the river widened so much, and consequently became shallower, ships of burden could come up to the very city. From various causes, in little more than half a century, Thorn greatly declined from its flourishing condition; for it surrendered by capitulation, in 1655, to Charles Gustavus, king of Sweden; and, in 1658, after a vigorous siege, it was taken by the Poles and Brandenburgers. In 1703, it was bombarded and taken by Charles XII. king of Sweden, who not only exhausted it by the heaviest contribution, but also demolished all the fortifications, contrary to the articles of capitulation. Between the years 1708 and 1710, great numbers of its inhabitants were swept away by the plague. In the following years, the revenues of the city suffered considerably by the confederations in Poland, and no less by the commotions occasioned by the competitors for the crown of that kingdom. In 1793, some Prussian troops entered this town, and from that time it has formed part of the dominions of that king; the king of Prussia taking possession of Thorn and Dantzic, together with the palatinates of Posenia, Kalish, &c. agreeably to a proclamation, published on the 25th of March. The soap, ginger-bread, &c. of Thorn, are every where in great request; and, accordingly, great quantities of them are exported. The asparagus that grows wild on some of the city lands, is not inferior to that which is cultivated with so much care in other countries; 70 miles S. of Dantzic. N. lat. 52° 55'. E. long. 18° 30'.

THORN, or *Thoren*, a town of France, in the department of the Lower Meuse. It had a noble abbey, whose superior

was a princefs. This abbey was assessed in the matricula at one horse or twelve florins; 7 miles S.W. of Ruremond.

THORN, in *Botany*, a name generally given to all trees, or the larger kinds of shrubs, which are armed with spines or prickles, but more particularly applied to the Linnæan genus CRATÆGUS, now sunk in MESPILUS. (See those articles.) Otherwise this name is almost as vaguely applied as its Greek and Latin synonyms, *ακανθός* and *spina*, neither of which is strictly appropriated to any one plant, or family of plants. *Ακανθός*, in Dioscorides, is the name of that well-known herb, whose leaves compose the ornamental part of a Corinthian capital, and which is the Brank-urline, or *Acanthus* of modern botanists, as well as of the generality of writers. But he applies the same likewise to a kind of thistle. The *Acanthus* of Virgil can scarcely be any thing else than the Common Holly, *Ilex Aquifolium*, though we do not find that this idea has occurred to his critics or illustrators. This shrub, so abundant in Italy, cannot be traced, under any other name or allusion, in the poet; while the bright aspect, the saffron or scarlet colour, the pliant twigs of his *Acanthus*; but, above all, its being evergreen and bearing berries, *Georg.* 2. 119, and subjected in winter to the shears of the gardener, *ibid.* 4. 137, are circumstances strikingly appropriate to the Holly, not to the Brank-urline; though the name may allude to the prickly foliage of either.

THORN-Apple. See DATURA, and DATURA *Stramonium*.

THORN, *Black*, or *Stoe-tree*, a species of the *prunus*, called *prunus sylvestris*. See PRUNUS and SLOE.

THORN, *Box*. See LYCIUM.

THORN, *Buck*. See RHAMNUS, and RHAMNUS *Catharticus*.

THORN, *Christ's*. See PALIURUS and RHAMNUS.

THORN, *Cockspur*. See CRATÆGUS, MESPILUS, and PYRUS.

THORN, *Egyptian*, a name sometimes applied to a plant which is armed with strong thorns or prickles, and which is said to have been lately found to make a good hedge-plant when kept low by being well cut in. It is also a very ornamental shrubby tree-plant for pleasure-grounds. See ACACIA.

THORN, *Evergreen*. See MESPILUS and PYRUS.

THORN, *Glastonbury*, a variety of the hawthorn. See CRATÆGUS and MESPILUS.

THORN, *Goat's*, a species of *Astragalus*; which see. See also TRAGACANTHA.

THORN, *Haw*. The fruit of this thorn has been found useful by farmers in feeding team and other horses. See CRATÆGUS and MESPILUS.

THORN, *Lily*. See CATESBÆA.

THORN, *Purging*. See RHAMNUS.

THORN, *Scorpion's*, a species of *Ulex*; which see.

THORN, *Spanish Hedge-hog*, a species of *Anthyllis*; which see.

THORN, *White*, a species of *Cratægus*; which see. See also MESPILUS.

THORN, in *Vegetable Physiology*. See SPINA and FULCRA.

THORN-Hedges, in *Agriculture*, a term often applied to such as are made of that plant, whether of the white or black kind. They in most cases form the best fences. See FENCE, QUICKSET, QUICKSET-Hedge, &c.

THORNBACk, in *Ichthyology*, the English name of a species of ray-fish, the *raia clavata* of Linnæus, prickly on the back, and with tuberculose teeth, and a transverse cartilage in the belly: the young fish have very few spines on them, and their backs are often spotted with white, and each spot encircled with black. (See RAIA.) This species

frequents our sandy shores, is very voracious; and feeds on all sorts of flat fish, and is particularly fond of herrings and sand-eels, and sometimes eats crustaceous animals, such as crabs. The thornbacks begin to generate in June, and bring forth their young in July and August, which (as well as those of the skate) before they are old enough to breed, are called *maids*. They begin to be in season in November, and continue so later than skate; but the young of both are good at all times of the year. Pennant.

THORNBURGH, in *Geography*, a town of Virginia; 74 miles S. of Washington.

THORNBURY, an ancient market-town in the lower division of the hundred of the same name, in the county of Gloucester, England; is situated 24 miles S.W. from the city of Gloucester, and 122 miles W. by N. from London. The town consists principally of three streets, in the form of the Roman Y, "having first," says Leland, "one longe strete, and two hornes goyne owt of it." The corporation is composed of a mayor, twelve aldermen, and a town-clerk; but the power of these officers is become much limited by disuse. A weekly market is held on Saturdays, but is not much frequented: here are three annual fairs. The church is spacious and handsome: the tower is lofty, and ornamented with rich open-worked battlements, and eight pinnacles. The population, as returned under the act of the year 1811, amounted to 1083; the number of houses to 216. At the north end of the town are the remains of an unfinished castle, which was commenced by Edward Stafford, duke of Buckingham, but stopped when he was beheaded in 1522. This castle may be considered as particularly deserving notice, from its affording some interesting specimens of the last gradation of castellated architecture. The former splendour of Richmond and Nonfuch, which were contemporary with it, are known only by description and engravings; and Hampton Court, though it rose under the hands of Wolsey at the same period, is certainly less rich in the minute and capricious ornaments peculiar to the build-ings of Henry VII. and his successor. A small part most resembling Thornbury, is seen at Windsor Castle, in an addition made by the first-mentioned sovereign. It is evident, from a survey made in the year 1582, that the whole southern side was habitable, and that it consisted of several chambers, of magnificent dimensions. The tower, the walls of which are perfect, was divided into four rooms, the duke's own apartments: this stands at the south-west angle of the castle. The duke was meditating the completion of the quadrangle which would have inclosed an area of two acres and a half, when his fatal attainder closed his views for ever. Within the circuit walls twelve acres were inclosed: annexed to them are small rooms, intended as barracks for soldiers. In the reign of Elizabeth, the principal timbers were taken away; and time has forwarded the dilapidation. A singular coincidence has been remarked between the front of Thornbury castle and that of Christchurch, Oxford; and it appears as if the rivalry of the duke and cardinal Wolsey was exerted even in their architecture. — *Beauties of England and Wales*, vol. v. Gloucestershire; by J. Britton and E. W. Brayley. Lysons's "Gloucestershire Antiquities," folio.

THORNE, a market-town in the lower division of the wapentake of Stralford and Tickhill, in the West Riding of the county of York, England; is situated near the south bank of the river Don, at the distance of 10 miles N.E. from Doncaster, 29 miles S. by E. from York, and 167 N. by W. from London. The town appears to be in a progressive state of improvement: it carries on a considerable commerce by the Don; and vessels trade regularly to

London. Ships of a size sufficiently large for the coasting trade, are built at the suburb called Hangman Hill, on the banks of the river, which is also the landing-place for all the merchandize. A canal cut from the Don to the Trent passes within a furlong on the west side of the town. A weekly market is held on Wednesdays; and two fairs annually, each of three days continuance, for horned cattle, woollen cloth, &c. According to the population returns of the year 1811, Thorne contained 637 houses, the number of inhabitants being 2713. The country about Thorne is for the most part fertile; but low, flat, and totally un-pleasant. On the east side of the town is a field of rich sandy loam, and more elevated than the other lands in the vicinity. Beyond this are vast moors, which however are mostly drained and inclosed.

At the distance of about three miles westward from Thorne, and on the Doncaster road, is Hatfield, a large village, famous in the annals of history for the battle fought there A.D. 633, by Edwin, the first Christian king of Northumbria, against Cadwallo, king of Wales, and Penda, the Pagan king of Mercia. This conflict, which was extremely sanguinary, terminated fatally for the Northumbrians: their monarch, and his eldest son Offrid, were slain, their kingdom subdued, and their country laid waste. This village was the birth-place of William de Hatfield, the second son of king Edward III. The extensive level of Hatfield Chase is said to contain within its limits 180,000 acres, of which nearly one-half was formerly a great part of the year under water. It was sold by Charles I. to Cornelius Vermuiden, a naturalized Dutchman, without the consent of the commissioners and tenants, to drain and cultivate; which he effected at the expence of about 400,000*l.*, but the affair involved him in ruinous law-suits. In the year 1811, an act was obtained for inclosing between eight and nine thousand acres of rich common in this neighbourhood, which must be ultimately productive of great public and private advantage. — *Beauties of England and Wales*, vol. xvi. Yorkshire; by J. Bigland.

THORNE, a small island of Denmark, in the Little Belt, near the island of Funen. N. lat. 59° 15'. E. long. 9° 53'.

THORNESS BAY, a bay on the N.W. coast of the Isle of Wight, between Newtown and Cowes.

THORNEY, a market-town in the north part of the hundred of Witchford, and county of Cambridge, England; is situated in the north-west side of the county bordering on Northamptonshire, 10 miles W. from March, 5 miles S.E. from Crowland, and 84 miles N. from London. It is surrounded by low and fertile grounds, which are now in a very complete state of drainage, the expence of which is defrayed by an annual tax of about a shilling *per* acre. Its ancient appellation was Ankeridge, which it obtained from the anchorites who dwelt in a monastery, or rather an assemblage of hermitages, founded here about the year 662, by Saxulphus, the first abbot of Peterborough. The Danes destroyed these hermitages in 870, and the place lay waste till 972, when Ethelwold, bishop of Winchester, founded on the site an abbey for Benedictine monks, which became an opulent establishment, and ranked among the mitred abbeys. In the year 1085, the ancient church was taken down, and a new one commenced by the abbot Gunter, but it was not completed till 1128. This structure possessed considerable magnificence, and was, according to Brown Willis, "at least five times as large as at present." When the abbey was dissolved by Henry VIII. great part of the church was destroyed; but the remainder escaped by being made parochial. The west front, which is the entrance to the church,

church, is the most perfect part of the ancient building. The revenues of the abbey were estimated, at the dissolution, at 41*l.* 12*s.* 11*d.* clear yearly value. Great part of its possessions, with the scite, was granted in 1549 to John, lord Russell, ancestor to the duke of Bedford, who is lord of the manor, and owner, not only of the town, but also of 19,000 acres of the surrounding lands. This extensive property is divided into farms from 25*l.* to 400*l.* *per annum*, generally in a very improved state of cultivation. A market is held on Thursdays, and two annual fairs were granted for Thorney to Francis, earl of Bedford, in the 13th year of Charles I. by the charter of incorporation for the government of the Bedford Level. The inhabitants of the parish, who are chiefly the descendants of French Protestants, are stated in the population return of the year 1811, to amount to 1675: the number of houses being 251.—Lysons's *Magna Britannia*, vol. ii. part 1. Cambridgeshire. Beauties of England and Wales, vol. ii. Cambridgeshire; by J. Britton and E. W. Brayley.

THORNEY *Island*, a small island, in a bay of the English Channel, near the coast of Sussex, about four miles in circumference, with a village of the same name, at the mouth of the Lavant; 7 miles S.W. of Chichester.

THORNHILL, Sir JAMES, in *Biography*, may be called the father of historic painting in England. He was the son of a gentleman of an ancient family in Dorsetshire, and was born at Weymouth in 1676. His family having fallen in fortune, he was obliged to resort to some profession for support, and guided by an early taste for painting, fixed upon that art as a base on which to raise a fortune and a name. He came to London, and was assisted by the celebrated physician Sydenham, who placed him under the tuition of an artist of little note, whose name is not known, and to whom, from the state of the art at the time, he must have been far less indebted for the progress he made, than to his own ingenuity and industry. After having practised for a while with some celebrity, he travelled to Holland and to Flanders; and thence visited France, but did not proceed to Italy. Most probably his object in this journey was only to acquire a knowledge of colouring; and he might have satisfied his mind on composition and form, by having spent three years in copying the cartoons of Raphael, which he was permitted to do by the favour of the earl of Halifax. These copies are in oil, and were bought after his death by the then duke of Bedford; and by his grace's successor, the late duke, were presented to the Royal Academy. They are wrought with care, but lack the delicacy of character and feeling observable in the originals. On his return to England, his reputation was increased, and honour and employment accompanied it. Queen Anne commissioned him to paint the interior of the cupola of St. Paul's, which he did in eight compartments. The subject assigned him was the history of St. Paul; and he treated it with considerable grandeur of style, both as to composition and execution; but his design wanted chastity and simplicity, and the heads of his figures have not sufficient refinement of expression. It was, however, the first attempt by an Englishman of the kind, and fully justified the preference given to him over La Guerre and La Fosse, who were then painting the halls and staircases of our nobility. He was afterwards employed to decorate an apartment at Hampton Court, with emblematical allusions to the history of the queen, and her union with her consort, George, prince of Denmark. But his grand work is the great hall at Greenwich Hospital, where he has painted naval trophies and allegorical figures in great profusion; and if much praise cannot be given to the purity of the design, it ought not to

be withheld from the brilliancy and vigour of the execution. Altogether, it is a work unrivalled in its kind here, and well entitled him to the honour of knighthood, which George I. soon after conferred upon him. This was some compensation to him for the mortification of having his demand for these paintings contested, and being in the end paid only at the labourer's rate of so much *per square yard*, (40*s.*).

He had the honour of so far re-establishing his family influence as could be effected by being chosen to represent his native town in parliament; but he did not enjoy his honours long, as he died at the early age of 57, leaving a son, named also James, for whom he had procured the appointment of serjeant-painter to the king, and a daughter married to Hogarth.

THORNY TREFOIL, in *Botany*. See FAGONIA.

THORNY *Raft-Harrow*, in *Agriculture*, a frequent weed in poor barren pasture land, which is not removed without difficulty, in consequence of its perennial nature.

THOROE, in *Geography*, a small island of Denmark, in the Little Belt, near the island of Funen. N. lat. 55° 15'. E. long. 9° 53'.

THOROLD, a township of Upper Canada.

THOROUGH, the common name of an inter-furrow between two ridges. They should always be clean and well-drawn.

THOROUGH-Base, or accompaniment to a continued base by figures.

Thorough-base is but an awkward translation of the Italian terms *basso continuo*, by which *accompaniment by figures*, without any other guide for the right-hand on keyed instruments, was at first called.

The French term *accompagnement* is the shortest and most comprehensive title for the harmony expressed by figures over the base; if, as Rameau has done in his "Code de Musique," we add "for the harpsichord or organ," as there are several other kinds of accompaniment besides that on keyed-instruments.

Rameau defines *accompaniment* or *thorough-base* in the following manner. "Accompaniment on the harpsichord or organ, consists in the execution of a complete and regular harmony, by seeing only the notes of one part of that harmony; and this part is called the base, being in reality the basis or foundation of the whole composition. This base is played with the left-hand, and its harmony with the right."

We shall endeavour to assist our musical reader, who has every thing to learn in the art of accompaniment, more by example than precept, and shall give him a series of progressive lessons in the musical plates, which will explain the whole mystery of musical combinations from the common chord, to the most extraneous harmony.

We take it for granted that he is perfectly acquainted with the musical scale or gammut, in the base and treble clefs at least, as well as with the time-table; and that the accidents of flat, sharp, and natural, are familiar to him.

The first thing, therefore, that we shall recommend to his study, is a table of intervals, both in notes and figures. See *Plate II.*

N<sup>o</sup> 1. presents a scale in half notes, in which all the flats occur, from the unison to the 9th; another scale expressed by sharps.

2. Number of semitones above the base in each interval.

3. Common chords, major and minor, to all the twelve semitones, modulating by 5ths.

4. Modulation in common chords, major and minor alternately, the base falling a 3d at each change. And in

order to familiarize the student to these chords in every part of the instrument, he is advised to make three voyages round the harmonical world : beginning with the 8th uppermost, then the 5th, and lastly the 3d ; and if no mistake is made, the last chord in each of these circumnavigations will be an octave above the first. But all difficulty in these exercises will be removed, if it be remembered that, in going from chord to chord, only one note is to be changed by the right-hand, which note is always the octave of the new base.

5. Exercise of common chords in accompanying the hexachords in all the keys, major and minor, to their fundamental bases : in the practice of which, dots are placed on the notes in the treble, which are to be played with the little finger. And though only the first hexachord, or six notes, is written backwards, each of them is intended to be played backwards as well as forwards.

Many years ago, we tried to reduce all the rules of thorough-bass to the compass of a *message-card*, and almost all the combinations expressed by figures to common chords. And now, if the preceding exercises of the hand in common chords have done their duty, the student will perceive, from an engraving of the two sides of this *thorough-bass card*, that what has been explained in words and figures on one side, is illustrated with notes on the other.

The second card goes somewhat deeper into harmonical mysteries, by what the French call *la regle de Poënaue*, or rule for accompanying with a specific chord every note of the key, ascending and descending ; which, if practised well in all the 24 keys, and impressed on the memory, will enable the student to figure a base himself, or to play without figures ; and by a seeming divination, without a treble part, to know the harmony that belongs to each base of a regular composition, in a diatonic ascent and descent.

After these chords are literally at the *fingers' ends* of the student, the following eight rules and exceptions in playing without figures must be observed.

1. An accidental *sharp* note in the base is generally accompanied with a  $\sharp$ , and changes the key to the half note above such sharp.

2. An accidental *flat* note in the base is generally accompanied with a  $\flat$ , and changes the key to the 4th below such flat.

3. To the 5th of a key, if repeated at a close, two chords are generally played in modern music ; the  $\frac{6}{4}$  and  $\frac{5}{3}$  : in old music, the  $\frac{5}{3}$ , and sometimes the 7th with the common chord.

4. When the base moves *per saltum*, a 3d, 4th, 5th, or 6th, common chords will do.

5. When the base rises a 4th, and falls a 5th alternately, and the contrary, each note may be accompanied by a 7th.

6. In syncopated or binding notes the  $\frac{4}{2}$  are played to the last part of the ligature, by *anticipation*.

7. Slow notes in the base, in old music, are generally accompanied, as on the plate, by a  $\frac{3}{2}$  and  $\frac{3}{4}$  alternately.

8. *Suspensions* of a whole chord, or part of a chord, are expressed by a dash (—) preceding the resolution.

The reverse of the second card contains explanations of these eight rules in notation.

It must be remembered, that whoever is ambitious of playing thorough-bass *without figures*, must previously possess the art of accompanying readily *with figures*. See COMPOSITION and COUNTERPOINT, to which thorough-bass is the best introduction : as what is good in playing, would be good, as far as *harmony* is concerned, in writing. In-

vention, fancy, and good taste, are necessary to break these chords into *melody*.

THOROUGH-Wax, in *Botany*. See BUPLEURUM.

THORP ARCH, in *Geography*, a village of England, in the county of York, where is a medicinal spring, impregnated with sulphur and steel ; 3 miles S.E. of Wetherby.

THORP, *Bishop's*, a village of England, in the county of York, where the archbishop has a palace, built by archbishop Gray in 1241 ; 3 miles S. of York.

THORPNESS, a cape on the east coast of England, in the county of Suffolk, forming the southern part of Solebay.

THORSAKER, a town of Sweden, in Gestricia ; 21 miles S.W. of Gefle.

THORSBERG, a mountain of Norway, in the province of Aggerhuus ; 18 miles W. of Tonsberg.

THORSHAVEN, a sea-port town of the island of Stromoe, and capital of all the Faroer islands, as well as the common market, and residence of the laudvogt, and king's council.

THORSTORP, a town of Sweden, in West Gothland ; 28 miles S.E. of Gotheborg.

THOS, THOUS.  $\Theta\omega\varsigma$ , in *Zoology*, a name given to an animal of the wolf-kind, but larger than the common wolf, common in Surinam. It is a species of the canis, with a light bent tail, and white belly. It never touches men or cattle, and rather provides its food by cunning than open force ; preying chiefly on poultry and water-fowl.

THOTCHI, or THATCHI HOTUN, in *Geography*, a town of Chinese Tartary ; 368 miles W. Tourfan. N. lat.  $42^{\circ} 52'$ . E. long.  $83^{\circ} 24'$ .

THOTRA, a town of Hindoostan, in the circar of Rantampour ; 40 miles S.S.W. of Rantampour.

THOU, JAMES AUGUSTUS DE, (THUANUS,) in *Biography*, an eminent magistrate and historian, was the son of Christopher de Thou, president of the parliament of Paris, distinguished for integrity and patriotism, and born at Paris in the year 1553. In the college of Burgundy, where he was placed at the age of ten years, his education was interrupted by a fever, which seemed for some time to have proved fatal to him ; but upon his recovery he studied the civil law, first at Orleans, and afterwards at Valence, under the celebrated Cujacius, in which latter place he commenced an intimate acquaintance with Joseph Scaliger, which was continued through life. Upon his return to Paris in 1572, he witnessed the horrors of the massacre of St. Bartholomew, and this scene impressed him with an eternal detestation of bigotry and intolerance. He was originally destined for the church, with the prospect of valuable preferments, which his uncle, the bishop of Chartres, intended to resign to him. In the mean while he travelled to Italy, the Low Countries, and Germany ; but upon the death of his brother, his views were changed, and the law became his destined profession. After the death of his father, whose memory he held in high veneration, he was made master of requests in 1584 : and in 1587, he married Marie Barbanfon, a lady of a noble family. Upon the revolt of Paris, on occasion of the league, in 1586, he repaired to Henry III. at Chartres, and was deputed by him to confirm the province of Normandy in its allegiance. On the assassination of the duke of Guise, his family at Paris received public insults, which made it necessary for his wife to make her escape in disguise, and he went to the king at Blois, who was almost deserted, and induced him to form a coalition with Henry, king of Navarre. Being at Venice, he was informed of the assassination of Henry III., after which he immediately joined the legitimate successor to the crown,

crown, Henry IV., at Chateaudun. The king, fully apprized of his excellent qualities, reposed confidence in him, and employed him in many interesting negotiations. On the death of Amyot, the king's principal librarian, De Thou was nominated his successor; and in 1594 he succeeded his uncle as "president á mortier." He officiated as one of the Catholic commissioners at the theological conference of Fontainebleau between Du Perron and Du Pleffis Mornai; and in the regency of Mary de Medicis, he was one of the directors-general of the finances. At the conference of Loudun, he acquired distinguished reputation by his virtue and ability; and he was joined with cardinal Du Perron in a commission for the reform of the university of Paris, and the construction of the college-royal, the edifice of which was begun under his superintendance. Although De Thou was occupied in a variety of public transactions, he reserved time for the cultivation of literature, and particularly for that of Latin verse, in which latter department he published, in 1584, a didactic and descriptive poem, "De Re Accipitraria," (on Hawking,) which was well received by the learned. He also gave to the public other pieces of Latin poetry, some of which were on scriptural subjects. But his "Opus majus," as we may call it, which has established his permanent fame, was "The History of his own Times," the first part of which appeared in 1604. The condemnation of this interesting work reflects indelible discredit on Henry IV. and his court: the ground of their enmity seems to have been the freedom with which he spoke of the popes, clergy, and the house of Guise, and the disposition he manifested to extenuate the offences charged upon the Huguenots, and to extol the virtues and abilities of that sect. Our author's History, when completed, consisted of 138 books, comprehending the events from 1545 to 1607. No person could be better qualified for undertaking such a work; and when we consider his native candour and love of truth, no one was more likely to execute it with impartiality. Mr. Hayley, in his "Essay on History," has with equal justice and eloquence characterized this illustrious writer in the following lines:

"There, in the dignity of virtuous pride,  
Thro' painful scenes of public service try'd,  
And keenly conscious of his country's woes,  
The liberal spirit of Thuanus rose:  
O'er earth's wide stage a curious eye he cast,  
And caught the living pageant as it past:  
With patriot care most eager to advance  
The rights of nature, and the weal of France!  
His language noble, and his temper clear  
From faction's rage, and superstitious fear!  
In wealth laborious! amid wrongs sedate!  
His virtue lovely, as his genius great!  
Ting'd with some marks that from his climate spring,  
He priz'd his country, but ador'd his king;  
Yet with a zeal from slavish awe refin'd,  
Shone the clear model of a Gallic mind."

To this work De Thou has annexed "Commentaries or Memoirs of his own Life."

Having lost his first wife in 1601, whose virtues he celebrated in a Latin poem; and having no issue, he married, in 1603, a second wife, of a noble family, by whom he had three sons and three daughters, and she died in 1616. This loss, and the calamities that befel his country on the murder of Henry IV., are supposed to have hastened his own death, which happened in 1617, at the age of 64 years. His library, which was very valuable, and which by his will was to have been kept undivided in his family, was nevertheless sold

after the death of one of his sons. The most complete edition of De Thou's History is that published at London in 1733, by Buckley, in 7 vols fol. with memoirs of his life, and other pieces not before published. Dr. Mead, always distinguished as the munificent patron of letters, contributed to render this edition peculiarly valuable, by the purchase of Carte's papers, which he had collected during his residence in France.—Mem. of De Thou, by himself. Moreri. Nouv. Dict. Hist. Gen. Biog.

The eldest son of De Thou, viz. *Francis Augustus de Thou*, born in 1607, inherited the virtue and talents of his father, and became a master of requests, and afterwards grand-master of the royal library, and acquired, by the gentleness of his manners and profound learning, general esteem. But falling under the displeasure of cardinal Richelieu, he was kept out of all confidential employments; and by this slight he was induced to join the party of the favourite Cinquars, who entered into a secret negotiation with Spain. De Thou was implicated in the conspiracy, and capitally condemned. He was beheaded at Lyons, in 1642, at the age of 35, dying with great resolution, and universally lamented; a victim to the vindictive feeling of Richelieu, because his father, in his History, had spoken in opprobrious terms of one of his family.

THOUARCE', in *Geography*, a town of France, in the department of the Mayne and Loire; 12 miles S. of Angers.

THOUARE', a town of France, in the department of the Lower Loire; 5 miles N.E. of Nantes.

THOUARS, a town of France, and principal place of a district, in the department of the Two Sevres, near the river Thoue. The place contains 2035, and the canton 13,950 inhabitants, on a territory of 317½ kilometres, in 24 communes; 31 miles W. of Poitiers. N. lat. 46° 58'. E. long. 0° 8'.

THOUÉ, a river of France, which runs into the Loire, a little below St. Florent.

THOUGHT, SENTIMENT, a general name for all the ideas consequent on the operations of the mind, and even for the operations themselves.

As, in the idea of thought, there is nothing included of what we include in the idea of an extended substance; and that whatever belongs to body, may be denied to belong to thought; we may conclude, that thought is not a mode of extended substance, it being the nature of a mode not to be conceived, if the thing, of which it is the mode, be denied. Hence we infer, that thought, not being a mode of extended substance, must be the attribute of some other substance very different.

F. Malebranche, with the spirit of a Cartesian, denies that a man who thinks seriously on the matter, can doubt but that the essence of the mind consists altogether in thought, as that of matter does in extension; and that, according to the various modifications of thought, the mind sometimes wills, sometimes imagines, &c.; as, according to the various modifications of extension, matter is sometimes water, sometimes wood, fire, &c. By the way, by thought he does not mean the particular modifications of the soul, *i. e.* such or such a thought, but thought, or thinking in the general, considered as capable of all kinds of modifications, or ideas; as by extension he does not mean such or such an extension, as a square, oval, or the like, but extension in the abstract, considered as susceptible of all kinds of modifications or figures.

He adds, that he takes it to be impossible to conceive a mind which does not think, though it be easy to conceive one which does not feel, or imagine, or will; in like manner

as it is impossible to conceive a matter which is not extended, though it be easy to conceive one that is neither earth nor metal, nor square, nor round, nor that is even in motion.

Hence it may be concluded, that as it is possible there may be matter which is neither earth nor metal; nor square, nor round, nor even in motion; it is also possible, that a mind may neither perceive heat nor cold, nor joy nor grief, nor imagine any thing, nor will any thing; so that these modifications are not essential to it. Thinking alone, therefore, according to this author, is the essence of the mind, as extension alone is the essence of matter.

But this doctrine is not now generally received. The followers of sir Isaac Newton, and the new philosophy, deny extension to be the essence of matter; and the followers of Mr. Locke deny thought to be the essence of the mind.

THOUGHTS, or *Tbaughts*, in a *Boat*, a name given by seamen to the benches on which the men sit down to row.

THOUINIA, in *Botany*, a noble genus, though consisting of only one known species, so named by the writer of this, in grateful remembrance of his distinguished friend M. André Thouin, member of the Institute, and at present Professor of Agriculture at Paris. This gentleman is one of the original foreign members of the Linnæan Society, and ranks among the best and most philosophical cultivators, as well as botanists, of this or any age. The present plant was selected out of the large and fine collection of new and rare specimens, given by himself to the younger Linnæus, chiefly from the herbarium of Commerçon. We were not aware of its having been named *Humbertia* by its discoverer, or *ENDRACHIUM* by Lamarck (see the latter article); where we have remarked that the name is barbarous; we should therefore not have adopted it, if known. *Humbertia* is not accounted for, there being no botanist on record of the name of Humbert, nor has any body explained or defended this appellation. The younger Linnæus had indeed established a *Thouinia*, *Suppl.* 9, after Thunberg; neither of them suspecting their plant to be a real *Chionanthus*, the *zeylanica* of *Linn. Sp. Pl.* 11. Swartz moreover, in his *Prodr.* 14, added a second species to this supposed genus, which he afterwards distinguished from it, by the name of *LINOCLERA*, under which head our doubts respecting even that matter are recorded. Considering therefore our original name no more justly superfered than our genus, we cannot allow it to give place to M. Poiteau's *Thouinia*. *Ann. du Musée fasc.* 13, though De Theis has decided otherwise.—*Sm. Plant. Ic.* 7. Schreb. 793. Willd. *Sp. Pl.* v. 1. 935. Mart. *Mill. Dict.* v. 4. (*Endrachium*; *Juss.* 133. *Humbertia*; *Lamarck Dict.* v. 1. 356. *Illustr. t.* 103.)—Class and order, *Pentandria Monogynia*. *Nat. Ord. Convolvuli*, *Juss.*

Gen. Ch. *Cal.* Perianth inferior, permanent, of five roundish, coriaceous, concave leaves; the three outer ones most thick and rugged, naked; two inner membranous at the margin, silky at the back. *Cor.* of one petal, twice the length of the calyx, bell-shaped, plaited, externally bristly; its margin in five triangular blunt segments. *Stam.* Filaments five, awl-shaped, smooth, declining, twice the length of the corolla, and inserted into its base; anthers incumbent, heart-shaped, of two lobes. *Pist.* Germen superior, ovate, very hairy; style of the length, figure, and situation of the stamens, a little swelling upward; stigma obtuse, notched. *Peric.* Berry globose, coriaceous, standing on the permanent calyx, of two cells. *Seeds* two in each cell, triangular, somewhat ovate.

Ess. Ch. Calyx inferior, of five unequal leaves, permanent. Corolla of one petal, bell-shaped; externally

bristly. Style simple. Berry coriaceous, of two cells. Seeds two in each cell.

Obs. We see no reason to adopt Jussieu's or Lamarck's idea of this fruit. They call it a coriaceous, or woody, capsule, which does not burst. Commerçon, who alone has examined it fresh, denominates it a *drupa*, which term we would restrain to pulpy fruits with a single nut, and therefore we judge the present to be a *bacca*, however tough or dry its substance may appear when dry.

1. *T. spectabilis*. Beautiful Thouinia. *Sm. Pl. Ic.* t. 7. Willd. n. 1. (*Humbertia madagascariensis*; *Lamarck n.* 1. "H. æviternia; *Commerçon. MSS. et Ic.* *Endrach-Endrach*; *Flac. Hist. Madagasc.* 137. f. 100. *Arbre immortel*.)—Native of Madagascar; unknown in the gardens of Europe. A tall and large tree, whose wood is yellowish, compact, heavy, as hard as iron, and almost incorruptible even under ground. *Lamarck*. The branches are round, scarred, silky towards the ends, where they bear tufts of leaves, intermixed with axillary flowers. The leaves are scattered, two or three inches long, obovato-lanceolate, obtuse, entire, smooth and shining, with a strong mid-rib, on channelled silky footstalks, without stipulas. Flowers on solitary, axillary, simple stalks, rather shorter than the leaves, each with a pair of small bractæes about the middle. Of the colour of the corolla we have no account; its length is about an inch; and the silky hairs on the outside, in a dry state, are of a shining brown. *Fruit* the size of a small plum.

THOUN, in *Geography*, a town of Persia, in the province of Khorassan; 75 miles W. of Herat.

THOURY, a town of France, in the department of the Eure and Loire; 3 miles E. of Janville.

THOUSAND. See NUMERATION.

THOUSAND Years' Reign. See MILLENNIUM.

THOUSAND Islands, in *Geography*, a cluster of small islands in the Straits of Sunda. S. lat. 5° 33'. E. long. 106° 33'.—Also, a number of small islands in the river St. Laurence, a little below lake Ontario; the part of the river being called Thousand Island Lake.

THOUSAND Lakes, a name given to a number of small lakes in America, near the river Mississippi; 60 miles above St. Anthony's Falls.

THOUSAND Rocks, rocks in the river St. Laurence; 72 miles S.W. of Montreal.

THOWLES, in a *Boat*. See THOLES.

THOYNARD, NICHOLAS, in *Biography*, a native of Orleans, was born in 1629, and at an early age a proficient in the learned languages, and in medallie science. His own original works were few, but he was liberal in the assistance he afforded to other writers. He published two short Latin dissertations on particular medals, and notes upon "Lactantius de Mortibus Persecutorum," and also a Critique on R. Simon's translation of the New Testament; but his principal performance was "A Concord of the Four Evangelists," in Greek and Latin, which was printing at the time of his death at Paris in 1706, and appeared in 1707, with learned notes, chronological and historical. In this work he maintains that St. Matthew, of all the evangelists, paid the least regard in his narrative to the order of time. This work was printed at considerable expence, and is now rare. Moreri.

THOYT. See THAUT.

THRACE, in *Ancient Geography*, an extensive country of Europe, situated in the S.E. Its natural boundaries are, on the S. the Ægean sea, the Propontis, and the Bosphorus of Thrace; on the E. the Euxine sea. Its limits to the N. and W. are not so determinately ascertained.

A penin-

A peninsula to the S., between the Melanic gulf and the Hellespont, made part of the continent of Thrace, but it assumed the name of the Chersonesus of Thrace.

The continent may be considered as divided into six parts: *viz.* 1. The part bounded to the W. by the river Melas, which discharged itself into a gulf of the same name. To the S. it had the Chersonesus and the Propontide, and to the E. the Bosphorus of Thrace and the Euxine sea. The chief towns of this part were, on the borders of the Propontide, Ganos, Bisanthe or Rœdestus, Perinthus called also Heraclæa, Selymbria, Byzantium; and on the Euxine sea, Dercon, Salmydessus.

2. The second part of Thrace extended from Melas to the Hebrus. It had several towns on the banks of the Hebrus, of which, the principal were Philipopolis and Adrianopolis, called also Orestes, and Trajanopolis. The Hebrus took its rise in mount Hæmus, and discharged itself into the Melanic gulf, near the town of Enos.

3. The third part lay between the Hebrus and the lake Bistonis to the W., consisting, according to some authors, of two subdivisions, *viz.* from the Hebrus to Lissus, and from Lissus to the lake Bistonis. On the sea-coast was situated Maronea, and in the interior of the country Scaptahyla, enriched by its mines.

4. The fourth part was narrow, and lay between the lake Bistonis and the Nestus to the W. The Nestus had its source to the N.W. of mount Rhodope, and near it were the towns of Jamphorinum and of Nicopolis ad Nestum.

5. The fifth part was situated N. of the Tæarus, a river which had its source in the mountains S. of Delnetum, and not far from the Euxine sea, and which ran into the Hebrus on the left side of it.

6. The sixth part lay N. of that part of the Hebrus which ran from Bessa towards the S.E. to Orestis. In this part were the towns of Berœa and that of Cabyla, S. of the Hæmus.

The Chersonesus of Thrace had for its boundaries to the S.E. the Hellespont and a small portion of the Propontide; to the N. the continent of Thrace; to the N.W. the Cardiac or Melanic gulf; this is the peninsula of Romania; and a wall separated it from the continent.

Those who seek the origin of the Thracians in the Old Testament, trace them to Tiras, one of the first descendants of Japhet. But whatever was the origin of these ancient people, it is certain that they were warlike and ferocious, and lived very much like savages. They were divided into different hordes, like the ancient Scythians or modern Tartars. This country, on account of the coldness of its climate, attributed to its mountains, was regarded by the Greeks with a kind of horror.

Thrace, in the Notitia Imperii, is divided into six provinces, *viz.* Europe, Rhodope, Thrace, Heminont, the second Mœsia, and Scythia. According to the Notitia of Hierocles, these six provinces contain 53 cities, of which the Thrace of Europe contained 14.

Thrace was anciently governed by kings; of these, the first who gave them laws for regulating and civilizing their manners was Zamolxis, a disciple of Pythagoras. Our limits will not allow us to trace its subsequent history, as far as it is known. The whole, or various parts of this country were possessed by Philip of Macedon, by the Athenians, by the Lacedæmonians, and by Alexander, who made a conquest of the whole country, nor did they recover their liberty till after his death. Lyfimachus, one of the successors of Alexander, was vanquished by a descendant of one of the ancient sovereigns of Thrace. But the tranquillity of the country was of short duration; for a party of Gauls,

under Brennus, ravaged Greece, and took possession of Thrace. The Thracians afterwards exterminated the Gauls, and restored the race of their ancient kings. This prince, whose name was Seuthes, and his descendants, reigned without interruption till the time of Vespasian, who reduced Thrace into a Roman province. It afterwards became subject to the Turks, who now possess it. See ROMANIA.

THRACES, or THRACIANS, in *Antiquity*, were an order of gladiators, reputed to be the most fierce and cruel of all. They were so called, either because they were natives of Thrace, or wore armour after the manner of that country. The particular weapon they used was the *fica*, or faulchion, and their defence consisted in a *parma*, or a little round shield, proper to their country.

THRACIA GEMMA, a stone mentioned by Pliny, and described by him to be of three kinds: the one of a plain green, but a considerably deep and strong colour; the other of a paler green, without variegation; and the third spotted with blood-coloured spots. This is a short description, but the stone seems to have been a jasper, of the nature of our green Oriental jasper and heliotrope.

THRACIUS LAPIS, in the *Natural History of the Ancients*, a stone often mentioned, and first called *Bene lapis*, from the place where it was first found, which was in the neighbourhood of Bina, or Bena, a town in Thrace. It has been by some authors allowed a place in the catalogues of the materia medica; but it is impossible for us to say, with any certainty, which, of several substances now known (which all answer in some degree to the accounts left us of it) is the real body they meant by that name.

It was an inflammable body, found in mines, and in the beds of rivers; and, in burning, afforded a very offensive smell.

Some of the late authors have supposed it was our common pit-coal the ancients expressed by this name; others, that it was jet; and others, the common cannel coal. Hill's *Theophrastus*, p. 34.

THRANITÆ, in the *Roman Trireme-gallies*, or those which had three rows of rowers; those of the upper row were called by this name, the second the *zygite*, and the lowest *thalamite*.

The *zygite*, or middle row of men, in these vessels, took up but very little room, having a conveniency of moving their hands and oars under the seats of those who sat next before them. See ENNERIS and POLYCROTA.

THRAPSTON, in *Geography*, a small market-town in the hundred of Navisford, and county of Northampton, England; is situated on the southern banks of the river Nen, 22 miles N.E. by E. from the town of Northampton, and 75 miles N.N.W. from London. The town, in general, is well-built; and at the west end is a handsome stone bridge crossing the Nen. By this river a considerable trade is carried on with Lynn, Northampton, and various other towns in its course. The country round Thrapston is open, and affords extensive prospects: from an eminence, half a mile to the south-east, may be seen at one view thirty-six church towers and spires. An annual court-leet and court-baron is held here; at which are appointed the governing officers, a constable, and a thirdborough; and also bread-weighers, whose office is to see that the bread, butter, and every other marketable commodity, is good and of just weight. A well-supplied market is held on Thursdays; it is the largest mart for hogs in the country: that branch alone returns every market-day, on an average, about 500*l.* Here are also two annual fairs, besides a large market, equal to either of the fairs, which is held yearly at Michaelmas. The population  
return

return of the year 1811, states the number of houses in this town to be 133, occupied by 708 persons. It appears from Leland, that there was formerly a monastic establishment here. He says, "At the very end of Thrapeston bridge stand ruins of a very large hermitage, and principally welle buildid, but a late discoverid and suppressid."—*Beauties of England and Wales*, vol. xi. Northamptonshire; by J. Evans and J. Britton.

**THRASEA PÆTUS**, in *Biography*, a Roman senator, who deserves to be recorded for his integrity and patriotism, was a native of Padua; educated in Stoical tenets, and a great admirer of Cato of Utica, whose life he composed. As a senator, he was a strenuous assertor of the liberty that remained under imperial despotism, and on this account he exposed himself to the obloquy of all the sycophants of power. His integrity commanded the acknowledgment of Nero, the execrable tyrant who put him to death, and many instances occur of his undaunted fortitude in maintaining it. We can only select the following: After Nero had committed the detestable crime of matricide, when the fervile senate was decreeing solemn thanksgiving and annual festivals to commemorate the event, Thrasea, who, we are told, had been accustomed to suffer other adulations to pass in silence, or with a slight assent, marked the profligacy of these motions by walking out of the senate-house; thus openly exposing his life to a danger which he contemned; for, conformably to the Stoical principles, he was used to say, 'Nero may kill me, but he cannot hurt me.' But though Thrasea often escaped the brutal vengeance of this imperial tyrant, his fate was at length decreed. In the year 66, the 13th of Nero, this monster having imbrued his hands in the blood of many of the most illustrious Romans, now resolved, says Tacitus, to extirpate virtue itself, by the destruction of Thrasea Pætus and Barcas Soranus. The amount of the charges against Thrasea only evinced his contempt of the base adulation of the senate, and his displeasure with the vices and enormities of the reign. No defence could be of any avail, and therefore Thrasea prepared in silence to submit to his fate. When the determination of the senate was announced to him, he was in his garden surrounded by a number of illustrious persons of both sexes, and attentively listening to Demetrius, a Cynic philosopher, who was discoursing on the nature of the soul, and its separation from the body. Having received the decree of the senate, he retired into his bed-chamber, and laid bare the veins of both arms, and then bled to death. Tacit. Annal. Suetonius. Dion Cass. Plin. Epist.

**THRASHING**, &c. in *Agriculture*. See **THRESHING**.

**THRASOS**, a term used by Hippocrates, to express a wildness and fierceness in the eyes of persons who approach to a delirium.

**THRASYBULUS**, in *Biography*, an eminent Athenian, was the son of Lycus, and the restorer of liberty to his country. When the government of the 400 succeeded the overthrow of the democracy in the year B.C. 411, he was commander of a galley; and in connection with Thrafsyllus, he destroyed the aristocracy in the camp at Samos, and re-established democracy there, and then proposed the recall of Alcibiades, in exile at Magnesia, and restored him to his country. Thrafsybulus and Thrafsyllus, having pursued the Peloponnesian fleet, brought it to an action in the straits between Sestos and Abydos, in which the Athenians captured 20 ships of the enemy, with the loss of 15 of their own. Another engagement soon after occurred, and the result of the arrival of Alcibiades's squadron was a complete victory on the part of the Athenians. When Alcibiades was made general of the Athenian forces both by sea and land, he nominated Thrafsybulus for one of his colleagues;

but a misunderstanding afterwards taking place between them, Thrafsybulus impeached Alcibiades before an assembly of the Athenians, and procured his disgrace. On occasion of the establishment of the thirty tyrants at Athens by the influence of the Lacedæmonians, Thrafsybulus was one of several other citizens who took refuge in the Theban territory; and zealous for the emancipation of his country from servitude, he engaged a small body of fugitives to join him in an expedition to Attica, and took possession of the important fortress of Phyla, on the frontiers of Bœotia. Besieged by the Greeks, Thrafsybulus by his activity repulsed them, and even followed them in disorder to Athens. Having also surprised a post which they occupied near Phyla, the thirty tyrants removed from Athens to Eleusis, and Thrafsybulus seized this opportunity of attacking the Piræus, and his enterprise succeeded. He then issued a proclamation, animating the Athenians to resist their tyrants, and to restore a free government. Having done this, he established himself in the Piræus. The constitution of Athens was then changed, by substituting instead of the thirty tyrants, ten magistrates, one from each tribe. The Lacedæmonians still retained their influence over these magistrates, who sent to Sparta soliciting assistance against Thrafsybulus. At length, however, this resolute commander prevailed so as to open a negotiation between the Athenians and the Spartan government, which terminated in the withdrawing of the Spartan garrison, and the re-establishment of a popular constitution at Athens. This happy close of the contest was followed by the union of citizens of both parties, in a solemn thanksgiving to Minerva at her temple in the citadel, when Thrafsybulus exhorted them to future concord. The remaining tyrants at Eleusis endeavoured to foment dissensions in Athens; but the business terminated in an act of amnesty or oblivion, which was passed by the influence of Thrafsybulus in the assembly of the people, and ratified by an oath. This revolution happened in the year B.C. 401. In accomplishing this event, Thrafsybulus acted with the most disinterested patriotism; for the thirty tyrants, when he seized the castle of Phyla, had offered to make him one of their number, and to pardon any twelve of the exiles whom he might name; to which offer he replied, that exile was much more honourable than any civil authority purchased on such conditions. Thrafsybulus remained for some time in unmolested retirement, enjoying the honour accompanying the olive wreath, which, according to the simple manners of the age, was bestowed upon him for his services. But in the year B.C. 390, after the death of Conon, the foreign possessions and influence of the Athenians were in danger of being lost; and therefore a fleet of forty ships was placed under the command of Thrafsybulus, with which he failed to the Hellespont. On this occasion he induced two Thracian princes to become allies to Athens, and compelled the Byzantines and the inhabitants of some other cities to abolish their aristocratical governments, and accept of the Athenian model and alliance. He next proceeded against the isle of Lesbos, in the Lacedæmonian interest, and reduced the whole island to obedience. Thence he failed for Rhodes, having previously raised supplies from the maritime towns of Asia, and the capital of Pamphylia. He also indulged his men in private pillage; and thus so much provoked the inhabitants, that they made an attack in the night on the tents, and put a number of the Athenians to the sword, among whom was Thrafsybulus himself. Such was the inglorious termination of a life that had been devoted to the benefit of his native country. Corn. Nepos. Un. Hist. Gen. Biog.

**THRAVE**, or **THREAVE**, of *Corn*, in most parts of England, is twenty-four sheaves, or four shocks of six sheaves

to the shock: though, in some counties, they only reckon twelve flocks to the thrave.

King Athelstan, anno 923, gave by charter, to St. John of Beverley, four thraves of corn for every plough-land in the East Riding of Yorkshire.

“ Ya fou *threve* be heaven king,  
Of ilka plough of est riding.”

THRAUPIS, in *Ornithology*, a name given by many authors to the bird more commonly called citrinella.

THRAUSMA, a name given by the ancients to a kind of gum ammoniacum, which was drier than the common, and more easily crumbled to pieces.

THRAUSTOMICTHES, in *Natural History*, the name of a genus of compound earths. The word is derived from the Greek *θραυστος*, brittle, and *μικθης*, mist.

The bodies of this genus are loams composed of sand and a less viscid clay, and are therefore of a friable or crumbly texture.

The earths of this genus are generally used to make bricks; and there are several species of them. Hill.

THREAD, in the *Linen Manufacture*, a small line or twist of flax, the weaving of which composes cloth. There is a stronger kind made use of to sew the seams of linen garments, or to mend them. The same term is applicable to cotton or wool. See SPINNING.

Thread, says an eminent French writer (Pajot des Charmes), bleached by the oxygenated muriatic acid, may be used by the sempstresses with much greater speed and briskness than thread of the same quality bleached in the field: it is less brittle, and may be struck much more effectually home to its place in weaving, and does not move afterwards. This information, he says, was received by him from impartial and unprejudiced manufacturers.

The thread of the Laplanders is very fine, white, and strong, but it is of a very different nature from our's; they know nothing of flax or hemp, nor of any other plant whose stalks might supply the place of these in making thread, but their's is made of the sinews of the rein-deer.

They kill of these animals a very great number continually, partly for food, partly for the skins, which they use in clothing themselves, covering their huts, and on many other occasions; the sinews of all they kill are very carefully preserved, and delivered to the women, whose province it is to prepare this necessary matter. They beat the sinews very well, after having steeped them a long time in water, and then they spin them out.

The thread they thus make is of any degree of fineness they please; but it is never any longer than the sinew from which it is made. They use this in sewing their clothes, shoes, gloves, &c. and the trappings of their rein-deer. The threads of the same sinew are laid up together, and are all of a length; and as the different sinews afford them very different lengths, they accordingly pick out such as the present use requires, both in regard to length and fineness. This sort of thread is made with much more labour than our's; but it is greatly superior to it on many occasions, where strength is rather required than beauty.

These people have, besides this, a way of making a sort of yarn of sheep's wool, which they weave into garters and a sort of ribbands, used by way of ornament; but they place no value on it, because of its want of strength. Scheffer's Hist. Lapland.

THREAD, in *Botany*, is understood of those capillaments usually found in the middle of flowers, as in the lily, tulip,

rose, &c. There are two kinds; those which support apices, are particularly called *stamina*; and those which have none, *pystilla*.

THREAD, *Gold*. See GOLD.

THREAD, *Virgin's*. See VIRGIN.

THREADS, *Air*, a term used by some to express those fine long white filaments, or thready substances, which we meet with in vast numbers floating about in the air in August and September.

The world has been much perplexed about the generation of these, till it was known that they were the work of spiders, and that they served those creatures to move from place to place by. They are long, downy, and very soft, and though they hold together when untouched, they stick to the fingers in handling, and easily break with a light touch.

The general method of these creatures spinning and weaving the webs, is by letting down the thread, then drawing it after them, and so disposing it as they think proper; but in the midst of their work of this sort, if they are closely observed, they will be sometimes found to desist, and turning the tail to the contrary way of the wind, they will emit a thread with great violence, no less than that with which a jet of water is discharged from a cock. In this manner they continue darting forth the thread, which the wind takes, and carrying it forwards, it soon becomes many yards long. Soon after this the creature will throw herself off from the web, and trusting herself to the air with this long tail, will ascend swiftly, and to a great height with it. The fragments of these lines, or the whole lines, and the spiders attached to them, though unobserved, make these air-threads, and the use nature designs them for, is evidently the wafting of the creature along the air, and giving it an opportunity of preying on gnats, and many other insects that inhabit the air, out of the reach of these creatures by any other means.

When the threads are newly spun, they are always single, and are generally seen ascending higher and higher in the air; but when they are seen coming down, they are found sometimes composed of three or four others, and either without any spider at the ends, or with two or three, or more. It is plain that this happens from the meeting of these threads one with another in the air, and their tangling together; and this incommodes the creatures, and brings them down.

These are what fill the air with the loose threads we see in autumn; and as these soon entangle together, and bring one another down, it is no wonder that they are more frequent in the lower regions of the air, than those with the spiders adhering to them, which usually rise to great heights, and sustain themselves there. And hence the origin of the threads was much perplexed among the enquirers, because they were found without any mark of the animal to which they owed their existence. The business of feeding is not all the use of these threads, but the creatures evidently sport and amuse themselves by means of them, floating about in the air, and changing height and place at pleasure.

When a spider has once raised itself from the earth in this manner, it does not descend always on the same thread it arose by, but draws that up at times, and winds it up into a hank with its fore-feet, and darts out another by way of support; and the new thread is made more or less long, as it is intended for a higher or lower flight. Philof. Transf. N<sup>o</sup> 50.

THREAD of *Glass* may be obtained of indefinite minuteness by means of the blow-pipe. When no thicker than

fine hair, it is extremely flexible and elastic; and if still finer, it may be wound almost like common thread without breaking. The way of doing it is very simple. A piece of glass tube is heated in the lamp, and the end drawn out into a thread by means of another piece of glass cemented to it. When a fine thread is once drawn, the end is carried round a reel or wheel two or three feet in diameter, and by turning the wheel and continuing to heat the tube, an endless thread is drawn out, winding round it as long as the artist pleases or the glass lasts. The quicker the wheel revolves, and the hotter the glass is kept, the firmer is the thread, which may thus be made as delicate as a single silk-worm's thread, with extreme flexibility. Different coloured threads are made in this way by using very deeply coloured glasses instead of common glass.

THREADS, in *Glass*. See GLASS.

THREAF, in *Agriculture*, a term signifying a handful, a bundle, or a pottle, in different districts of the country.

THREATENING LETTERS, in *Law*. By statute 9 Geo. I. c. 22. amended by stat. 27 Geo. II. c. 15. knowingly to send any letter without a name, or with a fictitious name, demanding money, venison, or any other valuable thing, or threatening (without any demand) to kill any of the king's subjects, or to fire their houses, out-houses, barns or ricks, is made felony without benefit of clergy. This offence was formerly high treason, by 8 Hen. V. c. 6.

The offence of sending letters, threatening to accuse any person of a crime punishable with death, transportation, pillory, or other infamous punishment, with a view to extort from him any money or other valuable chattels, is punishable by stat. 30 Geo. II. c. 24. at the discretion of the court, with fine, imprisonment, pillory, whipping or transportation for seven years. Blackst. Com. book iv.

THREATS, a species of personal injury. Threats and menaces of bodily hurt, through fear of which a man's business is interrupted, are comprehended under this description. A menace alone, without a consequent inconvenience, does not constitute the injury; but, to complete the wrong, there must be both of them together. The remedy for this is in pecuniary damages, to be recovered by action of trespass, *vi et armis*; this being an inchoate, though not an absolute violence. Blackst. Com. book iii.

THREAVE. See THRAVE.

THREE Chapters. See CHAPTER.

THREE Legs, *Compasses of*. See COMPASSES.

THREE, *Ombre by*. See OMBRE.

THREE, *Rule of*. See RULE.

THREE-legged Staff, an instrument consisting of three wooden legs, made with joints, so as to shut all together, and to take off in the middle, for the better carriage; and usually having on the top a ball or socket: its use is to support and adjust instruments for astronomy, surveying, &c.

THREE-pointed Pick, in *Agriculture and Rural Economy*, a tool of the pick-kind, having the broad end formed in a three-toothed manner, about six inches in length, of great strength, and having the width, from the out-sides of the teeth or prongs, of about six inches. The other end is formed in the gently curving ordinary one-pointed manner. When complete, it is provided with a handle of the strong wooden kind, inserted into the eye or socket of the head-part.

THREE-pronged Fork, a name sometimes applied to the common fork which is employed for various purposes on farms. See PRONG and SPUD.

THREE-share Horse-hoe, a light three-shared tool of the

horse-hoe kind, for one horse, which is often found very convenient and useful in working the intervals of ridged turnip crops, and those of similar kinds, as well as for different other purposes of tillage husbandry.

It is constructed and wrought somewhat in the form and manner of the common plough, the hoe parts being so contrived and set as to pare and clean the sides and bottom of each of the ridges in the same operation. See *Horse-Hoe*.

THREE Brethren Hill, in *Geography*, a town of Scotland, in the county of Selkirk; 5 miles N.W. of Selkirk.

THREE Brothers, three islands in the Indian ocean. S. lat. 3° 44'. E. long. 62° 25'.—Also, three islands in the East Indian sea. N. lat. 10° 42'. E. long. 108°.—Also, three small islands on the coast of Guiana, in the mouth of the Essequibo.—Also, three small islands in the Indian sea, near the E. coast of Madagascar. S. lat. 13° 20'. E. long. 51° 10'.—Also, three small islands in the East Indian sea. S. lat. 5° 30'. E. long. 132° 15'.—Also, three small islands in the Atlantic, near Prince's island. N. lat. 1° 32'. E. long. 7°.—Also, three small islands in the East Indian sea, near the W. coast of Amboyna. S. lat. 3° 39'. E. long. 128° 18'.—Also, small islands in the East Indian sea, near the S.W. coast of Celebes. S. lat. 5° 25'. E. long. 119° 38'.—Also, small islands in the bay of Gunong Tellu, on the coast of Celebes. S. lat. 1°. E. long. 120° 27'.—Also, small islands in the Indian sea. S. lat. 6°. E. long. 71° 36'.—Also, three hills on the N.E. coast of Terra del Fuego; 9 miles W. of Cape St. Diego.—Also, three hills on the E. coast of New Holland, so called by captain Cook. S. lat. 31° 40'.—Also, three islands on the Spanish Main, near the Mosquito shore. N. lat. 11°. W. long. 82° 52'.

THREE Creek Run, a river of Virginia, which runs into the Nottoway, N. lat. 36° 36'. W. long. 77° 12'.

THREE Hill Island, a small island in the Mergui Archipelago. N. lat. 10° 13'.

THREE Hills Island, one of the New Hebrides, in the South Pacific ocean, about 12 miles in circumference. S. lat. 17° 7'. E. long. 168° 35'. See *HEBRIDES*.

THREE Island Harbour, a bay on the coast of Patagonia, in the Straits of Magellan; 8 miles N.N.W. of Batchelor's river.

THREE Islands, small islands in the East Indian sea, near the E. coast of Bintang. S. lat. 1° 10'. E. long. 105° 2'.—Also, small islands in the Indian sea, near the coast of Africa. S. lat. 4° 50'.

THREE Islands Bay, or Harbour, a bay on the E. coast of the island of St. Lucia.

THREE Kings, an island in the South Pacific ocean, near the N. coast of New Zealand, discovered by Tasman. S. lat. 34° 12'. E. long. 172° 12'.

THREE Rivers. See TROIS Rivières.

THREE Rivers Harbour, a bay on the E. coast of the island of St. John, in the gulf of St. Laurence. N. lat. 46° 8'. W. long. 62° 10'.

THREE Sisters, three small islands on the W. side of Chesapeake bay.—Also, small islands in the East Indian sea. S. lat. 5° 42'. E. long. 105° 41' 36'.

THREE Stone Oar, a rock near the W. coast of Cornwall. N. lat. 50° 11'. W. long. 5° 32'.

THREE Sugar Loaves, small islands in the Mergui Archipelago. N. lat. 9° 13'.

THRELKELDIA, in *Botany*, has been so named by Mr. R. Brown, in memory of Dr. Caleb Threlkeld, a Dublin physician, who published a *Synopsis Stirpium Hibernicarum*

rum in 1727. This is an alphabetical catalogue, principally founded on the papers of Dr. Thomas Molyneux, or the communications of other people; nor does it, according to our judgment, entitle its editor to any scientific rank.—Brown Prodr. Nov. Holl. v. 1. 409.—Class and order, *Triandria Digynia*. Nat. Ord. *Holeraceæ*, Linn. *Atriplices*, Juss. *Chenopodeæ*, De Candolle, Brown.

Ess. Ch. Calyx pitcher-shaped, with an abrupt inner margin. Petals three, membranous. Stamens opposite to the petals, inserted into the receptacle. Capsule membranous, imbedded in the pulpy permanent calyx. Seed solitary, ovate.

1. *T. diffusa*. Spreading Threlkeldia.—Gathered by Mr. Brown on the south coast of New Holland, and in Van Diemen's island, growing on the beach. This is a small, diffuse, smooth *skrub*. Leaves alternate, femicylindrical. Flowers axillary, solitary, sessile, without bractæas. Seed furnished with albumen, which is embraced by the circularly inverted embryo. Brown. We have presumed to take for petals, though by no means pertinaciously, what Mr. Brown, led by the analogy of the natural order of the plant, considers as mere scales belonging to the calyx.

THRENGI, or THRENGES, in our *Ancient Customs*, a denomination given to vassals, but not those of the lowest degree, but such as held lands of the chief lord; otherwise called *drenes*, or *drenches*.

“Quia vero non erant adhuc tempore regis Willielmi milites in Anglia, sed threnges; præcipit rex, ut de eis milites fierent ad defendendam ferram: fecit autem Lanfrancus threngos suo milites, &c.” *Somm. Gavelk.*

The name was imposed by the Conqueror: for when one Edward Sharnbourn, of Norfolk, and others, were ejected out of their lands, they complained to the Conqueror, insisting that they were always on his side, and never opposed him; which, upon inquiry, he found to be true; and therefore he commanded that every one should be restored to their lands, and be for ever after called *drenches*, or *threnges*. *Spelm. Du-Cange.*

THRENODY, THRENODIA, formed of *ἄπνος*, *mournful*, and *ὠδρ*, *song*, a mournful or funeral song.

THRESHER, in *Ichthyology*, a name sometimes given to the sea-fox.

THRESHER, in *Agriculture*, a person employed in threshing out grain and other feed crops by means of the flail. See THRESHING, and THRESHING-Machine.

THRESHING, the act of beating out the corn or other produce from grain or other crops. The flail was the implement formerly used for threshing of corn, and which separated the grain from the straw and husks effectually and expeditiously; but which is now become much too tedious and expensive, as well as liable to many other objections, and always bruises a great many seeds, besides leaving many in the ears. It has been attempted to avoid these inconveniences by proper machines provided with a number of flails, or other parts answering the same purpose, made to move by the power of water, wind, steam, or horses. Of these, various sorts have been lately invented, and brought to very great perfection. See THRESHING-Machine.

Although there are many different methods made use of in separating the grain from the ear of the corn, that by the flail is the most general and common.

Sometimes two persons thresh together; and where more than two are employed together, which is sometimes the case, there must be frequent interruptions, and a consequent loss of time. It is suggested also, that the tool by which this sort of business is performed, should be well adapted to

the size and strength of the person who uses it, for preventing prejudicial fatigue. The best method of attaching the different parts of the implement together, is probably, it is thought, by means of caps and thongs of good tough leather. Iron is, however, sometimes employed. In the execution of the work, when the corn is bound into sheaves, it is usual for the threshers to begin at the ear-ends, and proceed regularly to the others; then turning the sheaves in a quick manner by means of the flail, to proceed in the same way with the other side, thus finishing the work in a quick easy manner by their becoming loose and open.

It is, however, observed by the author of the “*Experienced Farmer*,” that threshing with the flail is uncertain when most carefully performed, for the thresher may beat a long time and not meet with every head, which with the machine it is hardly possible to miss; and that the grain wasted by the use of the flail is certainly great. In short, he is of opinion that the corn lost by threshing with the flail, is more than would pay for threshing it by the machine all over the kingdom.

In some places it is the practice to thresh by the measure of grain, as the bushel, quarter, &c. while in others it is done by the threave of twenty-four sheaves, and in some by the day.

In whatever way the farmer has this sort of business performed, there is always much necessity for his constant inspection, in order to prevent the frauds and impositions that are so frequently practised upon him by the persons engaged in the execution of it.

The flail practice, however, from its being so extremely slow, tedious, and expensive, and at the same time requiring a great number of labourers, is perhaps only capable of being had recourse to with advantage on the smaller kinds of grain-farms, that are cheaply situated in regard to the command of workmen, and where the expence of having large machines would be much too great for the quantity of grain which they produce. But even in these cases, if the small horse or hand threshing engines that are constructed on cheap simple principles, and which occupy but little room, should be brought to perform the business in an easy, expeditious, and effectual manner, which seems not improbable from the improvements that have been recently made in this sort of machinery, it will most probably be to the advantage of such farmers to abandon it, as the saving in various ways must soon repay them the expence of the machine, and at the same time afford them a considerable profit.

It is moreover stated, that where threshing is performed by the flail, expensive barn-floors, either of the fixed or moveable kind, will constantly be necessary; but that the latter sort may sometimes be capable of being converted to other purposes, which may render it useful in other views and intentions, and thereby lessen the heavy charge of providing them. See THRESHING-Floor.

It is stated by the author of “*Practical Agriculture*,” that the superiority of the method by machinery over that of the flail is very considerable in many other respects, besides those of its executing the work in a much more clean and perfect manner, more cheaply, and with much greater dispatch, so as to admit of the farmer being present during the process in most cases.

It has been further said, that the flail is a tool which is only fit for the rude or savage state of a people; while the threshing by the machine can be performed at any season, as when the weather is wet, and when no other sort of work can be done, especially of the out-door kinds; and it will employ women and children, or boys, as well as other

## THRESHING.

forts of labourers. By the use of it, the farmer is enabled to get the advantage of markets, as he has thereby the power of felling and delivering almost any quantity within a little time; and by threshing out and placing the corn in a secure store room or granary, the great loss often occasioned by vermin may be wholly prevented and removed. Numerous other beneficial consequences may likewise result from the practice of threshing by means of machinery, but particularly that of saving the heavy expence of raising and upholding many different large buildings of the barn kind, on extensive farms of the arable description.

It may be stated, that the writer of the Account of the State of Agriculture in the County of Kent, found, on having different parcels of wheat-straw, of thirty-six pounds each, threshed out clean by the flail, by different farmers, and the same weight of straw threshed after it came from the machine, the average produce of corn left in the straw by the common mode of threshing was half a pint in every thirty-six pounds of straw, more than that left in by the machine method. And that, besides, sufficient supplies of both corn and straw may at any time be almost immediately provided, either for the purposes of feed, the market, or the feeding of animals, without the other operations of the farm being in any degree interrupted. It is likewise obtained with much less waste of the grain, and with less danger of its being injured by being bruised. Likewise, that from the then increasing scarcity of labourers, the great advance in the price of labour in all the well-cultivated districts, and the impossibility of having this sort of work performed in a clean and exact manner by the flail, the necessity as well as utility of the machine are established. And it is further contended, that the principal obstacles to machines of this nature being more generally made use of, are those of expence in their construction and erection, and the littering slovenly practice which prevails in some of the more southern districts of harvesting or securing the grain crops in a loose uneven manner. But the first of these objections may probably, it is supposed, be obviated by the construction and introduction of hand, or one-horse, or ox-threshing machines; and the latter by the daily discoveries that are making in the improvement of this sort of machinery.

It is conceived, that the opposition that has been raised against this practice, on the ground of its being calculated to deprive and prevent the labourers of employment during the winter season, is scarcely deserving of notice, as experience has fully shewn that no injurious consequences can result from it, as there must always be work enough of other kinds at such periods, where farms are under a judicious mode of cultivation.

It is on the whole supposed, however, that the saving of expence in this mode of threshing over that of the flail, must differ much according to the nature and manner of constructing the machinery, the power by which it is wrought, and also on the state and condition of the grain at the time of performing the operation, as well as the full manner and regularity with which it is supplied and managed. By some farmers it is considered as nearly, if not quite, one half, while others make it much less than that proportion. But with the best constructed machinery, there can be little doubt but that it will be performed on an average of different sorts of grain, and different states of them, at less than one-third the expence of the flail method, without taking into the account any thing for the vast saving in grain, in which some reckon a profit of at least 5 per cent.; others, as equal to the seed and prices of threshing, which is somewhat more than half the price in the flail method; or either of the other operations that may

be performed at the same time with the same machinery, such as those of winnowing or cleaning the corn, cutting straw into chaff, bruising and grinding the grain for cattle food, breaking bones for manure, and various other purposes and works.

In addition to the advantages that have been chiefly considered in respect to these machines, there is another which, in the then scarcity of procuring labourers, and indeed at all seasons and times, must be of great importance to the farmer, which is that of their enabling him to perform his work with greater certainty and convenience, and at much less expence of labour. It has indeed been stated by a writer, in a late periodical work on farming, that with a machine, two labourers on a farm will be equal to four without it; as they are left at liberty, during the winter months, for performing various other sorts of farm labour.

It has already been noticed, that the charge of this sort of work with these machines will vary considerably, according to the manner in which they are constructed. In the Agricultural Survey of the County of Kent, the expences and produce of threshing *per day*, in different sorts of corn, with an engine of the common construction, without the late improvements, are stated in the manner following:

### *Estimate of Threshing Expences, &c. by the Machine.*

<i>For Wheat.</i>		£	s.	d.
Eight men, at 1s. 4d. each	-	0	13	4
Four boys, at 1s. each	-	0	4	0
Four horses, at 2s. 6d. each	-	0	10	0
Cleaning and measuring 24 qrs. at 3d. each	-	0	6	0
		1	13	4

This is about 1s. 4d. *per quarter*, or nearly half the price of the flail method.

<i>For Barley.</i>		£	s.	d.
Cleaning and measuring 32 qrs. at 3d. each	-	0	8	0
Other expences, as above	-	1	7	4
		1	15	4

This is somewhat more than half the price of the flail method, this sort of grain having of late been usually threshed at about 1s. 6d. the quarter.

<i>For Oats.</i>		£	s.	d.
Cleaning and measuring 40 qrs. at 1d. each	-	0	3	4
Other expences, as before	-	1	7	4
		1	10	8

This is a little more than half the price of that by the flail; this sort of grain being commonly threshed at about 1s. 3d. *per quarter*.

The expences are here, however, calculated considerably too low for the succeeding times, as the men would since require 2s. or 2s. 6d. and the horses 5s. or 6s. each at least for the day.

But in the improved machinery of this kind fewer hands are required, and a number of other operations are performed

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formed at the same time, which greatly lessens the expences of executing the work.

In threshing with a powerful improved machine belonging to Mr. Harbottle, on the Riminham farm in Berkshire, according to the writer of the Agricultural Report of that district, the comparative calculations of expence and saving stand as below.

### *Estimate for Wheat.*

	£	s.	d.
A man to feed the machine with sheaves, at <i>per day</i>	}	0	2 6
A woman to throw up the sheaves into the sheaf-shelf, at <i>per day</i>		0	0 8
A girl or boy to hand and unbind the sheaves to the man who feeds, at the same	}	0	0 8
A man to riddle or sift the corn from cockles, or small chaff, at		0	2 6
A woman to assist him	}	0	0 8
Two men to remove the straw, and to make it up into bundles, at <i>2s. 6d.</i>		0	5 0
A boy to drive the horses, and attend to their paces, at	}	0	1 6
In all eight persons		0	13 6
Four horses, at <i>7s. 6d. per day</i> , a liberal allowance	}	1	10 0
Expence of threshing 20 qrs. which is done in the day of 12 hours		2	3 6
Ditto by the flail, at <i>3s. 6d. per quarter</i> , supposing a man can thresh a quarter in the day, which is too much	}	3	10 0
Saving by the machine in 20 qrs.		1	6 6
Or by the quarter	}	0	1 4

### *Estimate for Barley.*

Two men to feed and loose bands, at <i>2s. 6d.</i>	}	0	5 0
Two women to pitch up and supply machine, at <i>8d. each</i>		0	1 4
Two women to riddle, at <i>8d.</i>	}	0	1 4
Two men to remove straw, at <i>2s. 6d.</i> , and one boy ditto, at <i>1s. 6d.</i>		0	6 6
One boy to drive	}	0	1 6

In all nine persons	0	15 8
Four horses, at <i>7s. 6d. each</i>	1	10 0
	2	5 8

Usual price by the flail, <i>2s. 2d. per quarter</i> , 30 qrs. the quantity done in the day of 12 hours	}	3	5 0
Saving on the above quantity		0	19 4
Or by the quarter	}	0	0 8

### *Estimate for Oats.*

Nine persons employed, as for barley, and the same number of horses	}	2	5 8
Usual price by the flail <i>2s. per quarter</i> , on 40 qrs., the quantity done in the day of 12 hours		4	0 0
Saving on the above quantity	}	1	14 4
Or by the quarter		0	0 10½

It should be noticed, that these calculations are made fully to the highest, which is so much the more in favour of the machine.

In some of the northern districts, the execution of this sort of business by the machine is sometimes undertaken by

labourers, the farmer finding horses. By this method, in Yorkshire, the work costs for wheat *1s.* the quarter, and oats *6d.* And in Northumberland they make use of a machine, which threshes at the rate of 33 bushels *per hour*, or 264 in the day of eight hours. In this machine, the expences in the attendance of the threshing and dressing parts of it being merely that of three women; one to feed in, another to hand the sheaves to the feeder, and a third to take away and riddle the corn after it is winnowed; consequently the threshing and dressing the above number of bushels only costs *1s. 6d.*, while the threshing the same quantity by the flail would be  $\frac{7}{8}$ th part, or  $10\frac{1}{2}$  bushels, which at *2s.* the bushel is *21s.*; to which must be added *2s.* for the expence of a man and two women to assist in winnowing, which makes in all *23s.*

But in the Agricultural Survey of the County of Norfolk, there is an account of the expence of threshing with the machine in comparison with that of the flail, which furnishes a very different result. The machine was built by a person from Leith in Scotland, for Mr. Bevan, and cost *100l.*; and strongly shews, it is thought, that bad machines are worse than the old method of the flail.

### *Threshing by Means of the Flail.*

	£	s.	d.
Forty coombs of barley, at <i>7d.</i> come to	}	1	3 4
To dressing of ditto		0	2 0
	1	5 4	
Fifty coombs of oats, at <i>6d.</i>	}	1	5 0
Dressing ditto, at <i>1s. per score</i>		0	2 6
	1	7 6	
Forty coombs of rye, at <i>9d.</i>	}	1	10 0
Dressing ditto, at <i>1s. per score</i>		0	2 0
	1	12 0	
Forty coombs of wheat, at <i>1s.</i>	}	2	0 0
Dressing ditto		0	2 0
	2	2 0	

### *Threshing by the Machine.*

Forty coombs of barley take eight horses, at <i>2s. 6d.</i>	}	1	0 0
Ten men, at <i>1s. 6d. each</i>		0	15 0
To dressing ditto, five men one day	}	0	7 6
		2	2 6

Thus barley costs more by *17s. 2d.*

Fifty coombs of oats take eight horses, at <i>2s. 6d.</i>	}	1	0 0
Ten men, at <i>1s. 6d. each</i>		0	15 0
To dressing ditto	}	0	7 6
		2	2 6

Thus oats cost more by *15s.*

Forty coombs of rye take eight horses, at <i>2s. 6d.</i>	}	1	0 0
Ten men, at <i>1s. 6d. each</i>		0	15 0
To five ditto, at <i>1s. 6d. one day dressing</i>	}	0	7 6
		2	2 6

Thus rye costs more by *10s. 6d.*

Forty

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	£	s.	d.
Forty coombs of wheat take eight horses, at } 2s. 6d. - - - - - }	1	0	0
Ten men, at 1s. 6d. each - - - - -	0	15	0
Five ditto to dressing - - - - -	0	7	6
	2	2	6

And wheat costs more by 6d.

The calculations of the expences are here made greatly under the rate of wages and hire of horses which has since taken place.

The above should lead the farmer to be careful in putting up these machines; and to be certain of their being constructed in such a way, as to answer the purpose in a perfect manner before he begins the work.

It is well observed by Mr. Somerville, in the Agricultural Report of East Lothian, in calling the attention of the public to the unrewarded merits of Mr. Mickle, in bringing the threshing machine to a state of perfection, that it is computed, by those who have paid every possible attention to the subject, that in Britain about 7,500,000 acres are annually employed in raising grain, the produce of which, if averaged at three quarters *per* acre, amounts to 22,500,000 qrs.; and, as it is admitted that the surplus quantity gained by the use of threshing machines is at least a twentieth part more than when the flail is used, it will appear that 1,112,500 qrs. would be saved annually, were the whole of the grain in the kingdom threshed in that way; the value of which, if only calculated at 3s. *per* quarter, would be 1,781,250*l.*; to which adding the savings of expence, at 1s. *per* quarter, upon 22,500,000 acres, *viz.* 1,125,000*l.*, it would make the enormous sum of 2,906,250*l.* sterling; a fact almost incredible to any but those who have turned their attention to the subject, and are well acquainted with the great difference between the threshing-machine and the flail.

All sorts of grain should be in a proper, hard, dry condition, when it is to be threshed out, otherwise the work cannot be performed in a clean and perfect manner, whether it is to be executed by the flail or the machine.

It is a remark of the time of Lisle, founded on his own extensive experience, that wheat threshed in damp weather generally yields but little flour, with a great deal of bran, when it is ground; and that if it be put into sacks, it will grow mussy in less than three weeks, let the weather be ever so dry afterwards: but if, on the contrary, it be threshed when the air is perfectly clear and dry, it will keep well in sacks for a long time, especially if these are laid upon tressels high enough to secure them from the dampness of the ground or floor.

But for keeping of the meal or flour, in general, there is no better way than first to bolt and clean it from the bran or husks, which is apt to make it mussy, and then to tread it down as hard as possible, and head it up closely in clean, dry, tight, and well-bound casks, which must be laid in a cool dry place.

It may be noticed, that the beards of barley come off best, in threshing, when the sheaves or swarths of this corn have taken the dew before their being housed. It will keep well in the mow unthreshed for one year; but for making it into malt, which must be done before the heat of the summer comes on, it should not be kept above a year and a half, or at most two years: otherwise it will be filled with weevils or insects; unless it has been previously cured in a stove or kiln.

But oats, from their being defended with a double husk, are the grain least subject to harbour vermin. The best way to keep them after they are threshed, which should be done

when dry, is to dry them well on a kila, and then to barrel them up in clean close casks.

As for beans and peas, they always thresh best after they have sweated in the mow, which they are very apt to do; as the whole crop of either of them never ripens altogether, the green parts heat, and communicate their ferment to the whole heap. The danger to be guarded against is, that they do not heat too much. For this reason, farmers generally choose to stack them without doors, rather than to house them; that they may be the more thoroughly dried by the sun and air. As beans are a very large seed, and consequently full of moisture, it is found best to let those that are intended for keeping, sweat and season in the mow until March, when they may be threshed without danger, for beans never give again, after they have once been thoroughly dried and hardened.

And vetches, when wanted for sowing immediately after they are cut, may be threshed very well on a hurdle, with a cloth; though they then be too soft, notwithstanding their being ripe, to be threshed on a floor, where the flail and the thresher's feet would bruise and break them.

In general, in the business of threshing, as the work proceeds, it will from time to time be necessary to remove all the long straw from the corn beaten out of it, which last always lies underneath, with a prong or fork, and then the pieces of straw, broken ears, &c. with a wooden rake. The remaining grain should then be shovelled up on one side of the floor, and the work be repeated till enough be threshed out to make what is commonly called a clearing. The heap should then be wholly passed through a wide sieve, which retains only the bits of straw, and such fragments or ends of the ears as have escaped the flail. These frequently contain some good corn, and form an useful fodder for most sorts of animals, being what are commonly called *cavings*, as seen below.

Much labour may often be saved in the use of the sieve by fastening a loop to its rim, and resting it thereby on a hook suspended by a rope. This will sustain half the weight of the corn, and the necessary circular motion may more easily be given to it.

After much threshed grain has thus accumulated on the threshing-floor, and the short straw and chaffy matter have been separated from it, as just noticed, by passing it through a wide riddle or sieve for the purpose, which should always be done before too much grain has been collected, as in that way the bruising of it is more effectually prevented; it must be put by to afford more room. The short chaffy substance thus separated from the grain is in some districts denominated *cavings*, or *caving-chaff*, and is capable of being employed with advantage, as seen above, in the feeding of horses, or neat cattle and sheep. When this has been done, the loose grain should be thrown into a chamber or other place conveniently formed for receiving it, where it should remain till a sufficient quantity has been collected to render the clearing and cleaning of it by some kind of machine for the purpose, requisite. But the improved threshing machines render this unnecessary, as they dress or clean it at the same time it is threshing out. See *WINNOWER Machine*.

Furze tops in their young states of growth are in some northern situations beat or threshed by the flail, and in that way bruised as horse-food, where proper machinery for this purpose is not at hand. The work-horses during their use have little other food, it is said, though performing great labour.

From the whole of what has been said, it is evident that the farmer should always consider well before he decides on the mode of threshing which may be the most proper and advan.

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advantageous, as well as the most suitable, to the fort of farm which he holds.

**THRESHING-Floor,** the floor on which grain is threshed out in the barn or other place. All floors of this fort should be well formed and constructed, of whatever fort of materials they are made, as without it they give way and fall to pieces. When the material employed in this intention is wood, the timber should always be of the best kind, and well seasoned, being put together in a careful and firm manner, and when of the earthy kind, the different matters be well reduced, wrought together, and laid up for some length of time before the floor is formed, being then laid down in a smooth even manner, and made firm and solid by frequent ramming with a proper tool for the purpose, until the flooring substance, whatever it may be, becomes quite dry.

It has been observed, that as grain is threshed out by machinery, from the circumstance of its being separated from the straw immediately, and not permitted to remain upon the floor for above an hour or two, when brought to market, is always much drier, looks better, and brings a higher price than that which is threshed by the hand, and suffered to remain upon the floor for weeks, where it becomes musty, loses its colour, and is so raw, that much of it is bruised and rendered useless in the working. Therefore, if the flail-mode of threshing is still pursued, it is supposed that the inconveniences above-mentioned may, in some degree, be remedied, by paying proper attention to the materials of which the floor is made, and raising it sufficiently above the reach of moisture. Where the barns are very extensive, and the price of wood uncommonly high, as is the case at present, a very good and durable threshing-floor may sometimes be made by laying an uniform stratum of round gravel, covering it with a coat of well-tempered clay; above which, a mixture of clay, brick-dust, forge-ashes, and a small proportion of lime, will make it a hard uniform floor, proper and suitable for the purpose of threshing upon. It is observed that the brick-dust and forge-ashes should previously be beaten very small, and well incorporated with the clay, using a sufficiency of water to bring the whole to the consistence of mortar; in that state the lime, having been previously slaked, should be incorporated with the other ingredients; the whole smoothed over with the back of the spade, and allowed to remain in a round heap for two or three weeks, at the end of which time it should be turned over in the same manner as plaster lime, and after being rendered sufficiently soft with water, it may be spread upon the floor, an operation that will require some pains on the part of the workman. The floor, in the first instance, should have the coat of clay, that is laid above the gravel, rendered perfectly smooth and uniform, by rolling, beating, or otherwise; the finishing coat, composed of the mixture above-mentioned, may then be applied, taking care to break the surface of the clay with shallow lines, in the way practised by plaiters, for the purpose of making one coat adhere to another in a firm and perfect manner.

Many other sorts of materials, somewhat of this nature, are made use of for threshing-floors in different districts of the kingdom.

The following plan has been suggested as the means of excluding rats and mice from the barn and threshing-floors. First, that when the floor is entirely of wood, the space between the sleepers, upon which the boards are laid, should be entirely filled with washed gravel, well beat down, an operation which, when properly done, will effectually prevent the entrance of either rats or mice; where this precaution is not taken, when the floor is laid, openings should be

made at the bottom of the wall large enough to admit cats, a contrivance that will have the two-fold effect of destroying the vermin, and affording a free circulation of air. Secondly, that when the floor is of clay, the vermin generally burrow under the foundation, and have the entry to their retreats at the bottom of the wall: in such cases, their access into the barn will be, in some measure, if not entirely, prevented, by mixing a considerable quantity of broken glass with the materials with which the threshing-floor is made. It does not appear necessary to mix the glass with the clay over the whole floor; perhaps two feet from the wall quite round will be sufficient. And thirdly, that the top of the wall, as furnishing a temporary retreat for vermin, deserves also to be noticed: in every instance it is customary for the mason to level the top of the wall previous to the roof being put on, which, when the building is finished, is left in that state, by which a considerable space remains for the shelter of rats and other vermin: to prevent this, as soon as the roof is finished, the building of the wall on the inside should be continued upwards till it joins the roof, to which it should be closely united by hard plastering. It is supposed, by these precautions, and smooth plastering, the walls of barns as well as the threshing-floors may be preserved free from vermin.

**THRESHING-Machine,** an engine of the mill kind, contrived for the purpose of threshing grain, seeds, and pulse out of the straw or the ear.

This is a sort of mill or machine that has been chiefly constructed on the same principles as those of the flax-mill, and which is capable of being wrought by different powers, as those of horses, oxen, wind, water, and steam; but those of water and animals are the most proper and convenient in most instances: in some cases, the grain being beaten or swung out of the ears by means of beaters attached to a cylinder that has much velocity, while in others it is rubbed out by suitable means against confined cylinders, as will be more fully seen and explained in what is said below.

There is some reason to suppose, that the original hint or notion of these mills or machines, was derived a long time ago from Holland or the Low Countries, and thence brought into the northern parts of this country, where the different parts of the machinery of them have since been gradually undergoing much modification and improvement, to render them more suitable and efficient for the purpose; so that they have now attained a considerable state of perfection in most parts of the kingdom. The first of these improved machines was, as Mr. Somerville says, invented by a Mr. Menzies, brother to the then sheriff *depute* of the county: the machinery was driven by a water-wheel, which put in motion a number of flails of the same kind with those used in threshing by the hand. Trials made with these machines were so far satisfactory, that a great deal of work was done in a given time, but owing to the velocity required to do the work perfectly, they soon broke, and the invention fell into disgrace.

Some time in the year 1758, another attempt was made by a farmer in the parish of Dumblane, in Perthshire. His machine was constructed upon principles similar to the flax-mill, having an upright shaft with four arms inclosed in a cylinder, three feet and a half in height and eight in diameter, within which the shaft and its arms were turned with considerable velocity by a water-wheel. The sheaves, being presented by the hand, were let down from the top upon the arms, by which the grain was beat out, and together with the straw descended through an opening in the floor, where they were separated by riddles and fanners, also turned by the water-wheel.

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And it is added, that, about twenty years after this, a third attempt was made by a Mr. Elderton, near Alnwick, and a Mr. Smart, at Wark, both nearly about the same time. Their machines were so constructed as to act by rubbing, in place of beating out the grain. The sheaves were carried between an indented drum, about six feet in diameter, and a number of rollers of the same description ranged round the drum, towards which they were pressed by springs, in such a way as to rub out the grain when the drum was turned round. Upon trial, this method of construction in these machines was also found defective, as along with its doing very little work in a given time, it bruised the grain, and so materially hurt its appearance, as to lessen its value considerably in the markets.

It is further stated that the machine, in its then imperfect state, was seen by the late sir Francis Kinloch, bart. of Glimerton, a gentleman well acquainted with mechanics, and who had paid much attention to country affairs; it occurred to him, that the machine might be rendered more perfect, by inclosing the drum in a fluted cover, and fixing on the outside of it four fluted pieces of wood, capable of being raised a little from the circumference by springs, in such a way as to press against the fluted cover, and to rub out the grain as the sheaves passed between them; but after repeated trials, it was likewise found to bruise the grain nearly as much as the model from which it was copied. In that state it remained for some time, and was afterwards sent by sir Francis to a very worthy and ingenious character, Mr. Mickle of Know-Mill, in his neighbourhood, (a millwright by profession,) who had for a considerable time employed his thoughts upon the same subject. After much consideration, and several trials, it appeared to Mr. Mickle, that the purpose of separating the grain from the straw might be accomplished upon a principle different from any that had hitherto been attempted, namely, by skutches acting upon the sheaves by their velocity, and beating out the grain, in place of pressing or rubbing it out. Accordingly a model was constructed at Know-Mill, in which the grain was beat out by the drum, to which it was presented through two plain feeding rollers, which were afterwards altered for fluted ones. The first machine, on a large scale, executed upon this principle, was, it is said, done by a son of Mr. Mickle's, for a Mr. Stein of Kilbagie, in the year 1786, which, when finished, performed the work to the satisfaction of all parties. A patent was afterwards applied for and obtained in 1788. Since that period, as well as the first introduction of these machines, many other improvements have been made on them by different ingenious artificers in many different places; a screen has been added for the grain to pass through into a winnowing machine, and a circular rake to remove the straw from it; as before this addition, the straw was forced out from the beater upon the upper barn-floor, and required much time and labour in shaking and putting it into order, which by this contrivance is saved. And besides having a sufficient degree of velocity, without its being so great as to injure the machinery, it is found that a point upon which the clean threshing of all sorts of grain materially depends in the use of this machine, is the management of the iron covering, under which the beating-wheel, having six or more beaters, moves: in some machines this is fixed, while the beating-wheel is capable of being raised or depressed at pleasure; but a more late improvement is to render the iron roof moveable and the wheel fixed, the iron being placed so close to the beaters, that the grain is rubbed as well as shaken out of the ear. And in some cases the beaters are somewhat rounded, but the flat form is probably better.

Different machines of this sort are also said to have been lately constructed so as to work with chains instead of cogs, and to perform the business in a satisfactory manner. Another great improvement is likewise believed to have been made on the feeding rollers; which is that of having the upper roller, instead of being one solid cylinder of wood, with rods of iron fixed upon it, as was formerly the case, an octagon or decagon of cast iron, and divided into four parts, which are loosely joined into each other, so that in turning round, each part can rise or fall in a separate manner, according as the corn is spread out in a thicker or thinner way. The advantage is, that by means of this contrivance the corn is regularly held; whereas, by the roller being all of one piece, if at one part the grain should happen to be more in a heap or lump than at another, the whole roller is raised, and a great part of the grain passes through, without having been held sufficiently to the beaters, and is consequently imperfectly threshed out.

This sort of machine is sometimes constructed with a vertical shaft, on which is fixed in a horizontal manner an iron bevil wheel, six feet in diameter, which drives another about eighteen inches diameter upon a tumbling shaft, upon which is also an iron spur-wheel, three feet six inches in diameter, driving one about ten inches upon a short iron shaft, which likewise carries a drum or pulley, three feet six inches in diameter, from which a six-inch strap drives one nine or ten inches in diameter, hung upon the iron shaft or spindle which runs quite through the wood-beater or barrel, two feet in diameter, and three feet in length, having fixed upon it, by means of strong screws into its iron bonds, twelve wrought-iron bars, about an inch square, which beater making upon its horizontal axis about three hundred revolutions in a minute, and consequently nearly three thousand six hundred strokes in that space of time; the corn being carried to it by means of a cloth, which is moved forwards by rollers, lying nearly upon a flat surface of six feet long, by three feet wide, two to three feet high from the ground-floor, which is a very convenient position to feed upon, and passing between a pair of fluted rollers, over a bar, comes in contact with the beater, through a cavity, which may be varied by screws, from an inch in width, to the thickness of a grain of corn, when the straw is immediately delivered, perfectly clean upon the floor on the outside of the machine, no more injured for thatch, or other purposes, than by the flail, and the corn in its passage under the beater is filtered through a wooden frame to the floor, where it remains for removal. Upon this kind of threshing-machine many different trials have been made in the view of ascertaining what sort of power, construction, and velocity or speed, would produce the best and most beneficial effects on the work, and many improvements have been suggested which we have not room for reciting.

Some machines of this sort have large wooden fly-wheels, of from twelve to fifteen feet diameter, fixed upon the tumbling-shafts, which run over or above the horse's heads, perhaps made of fir-timber, as cork unfortunately is seldom to be met with; but as their speed, in such a situation, can rarely afford any assistance, the lighter they are, the less impediment, it is supposed, they will produce. The bars or beaters are also sometimes as much as an inch and a half, or two inches thick, from the barrel or roller upon which they are fixed, and the roller itself three feet or more in diameter; but so much of the bar is certainly, it is thought, unnecessary, as exceeds the length of straw drawn in by the rollers, during each interval between the strokes, and which is seldom more than half an inch; consequently, whatever is more than three quarters, produces an increased impediment.

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ment. The greater the diameter of the same beater, from meeting with the principal resistance, so much farther from the centre, of course, the proportionately greater power is required to work it; but this last description of beater is said, in general, to be found to make the best work, and the reason is thought obvious: they are necessarily driven by water, steam, or a number of horses, and, it is concluded, calculated to make the same number of revolutions in a minute as one of two feet, in which case their velocity, on which all depends, is just half as much more—a most important point indeed. The means of regular steady driving is likewise of material importance in all machines of this nature, where animal labour is necessary.

A very powerful improved machine belonging to Mr. Harbottle, of the Rimingham farm, near Henley on Thames, consists of a horse-wheel which contains 136 teeth, or pinion wheel with 26, a large wheel with 88, another with 21, the same with 88, and a further one with 21, forming the drum. Underneath the drum is the contrivance for winnowing, or the wheel that separates the chaff from the corn, by blowing it back into a bin below the feeder, and allowing the corn to fall into a box, from whence it runs. Every revolution of the horse-wheel in this machine produces eighty-eight and a half of the drum; and as the horse-wheel goes about three rounds of twenty-four yards each *per* minute, or two miles and a half in an hour, the drum of consequence must revolve on its circumference, of three yards and a half, 265 times in a minute, or 927 yards. The feeding-board is five feet four inches wide. The drum-wheel is four feet four inches diameter, being covered with sheet-iron, and has four beaters, which project four inches; making the above number of revolutions to one of the horse-wheel, and the horses going the above distance in the hour; in a path twenty-seven feet diameter. The cogs of the wheels are of white thorn properly seasoned, working into others of cast-iron; payed only with black lead, not any grease being employed. The level of the stage on which the men stand to feed, is eight feet above the barn-floor in which the machine is fixed.

The drums of threshing-machines, it is remarked, in general revolve from sixty to a hundred times for one revolution of the horse-wheels; and that in proportion as these move slower, the horses must go faster, so that the utmost nicety is necessary to properly adjust this: as if the horses are under the necessity of trotting, they are greatly injured in long continued exertion, and if they move too slowly, the work is imperfectly performed. A steady common walk is the pace at which horses should be kept, and the drums of machines should be formed accordingly, in order fully to effect their work, and at the same time to enable the horses to do a good day's labour without too much fatigue and inconvenience.

This machine will thresh, it is said, from twenty to thirty quarters of wheat in twelve hours in great perfection; from thirty to forty-five of barley in the same time; and from forty to fifty quarters of oats. It threshes every thing perfectly clean when the grain is in sheaves. But though it cleans the corn from chaff, as seen above, winnowing is required afterwards. It was seen with one feeder to thresh twenty-two large and long sheaves in three minutes, without any variation in the ordinary movement of the horses. This machine was constructed by Elliott of Hexham, in Northumberland, and cost about 200*l.*, without the expences of fitting up, &c.

It is stated, in the Essex Agricultural Report, that Mr. Newman of Hornchurch has a threshing-mill which was built by two young millwrights from Somersetshire, in which there are two new circumstances of improvement, one of which is a movement so prepared, as that the person who

feeds the mill, by putting his foot on a pedal can lift one of the fluted cylinders out of its work, so that the wheat-ears having been advanced far enough to be threshed, the straw may be drawn back again and be prevented from being broken; the other is a click, or iron, which admits the horses to be stopped suddenly without stopping the beaters; by which the connection is removed for a moment, so that one operates without the other: this is of capital importance in working the machine. Representations of these improvements are given in the above work.

These machines have occasionally grinding-mills combined with them, and are in this way found very convenient and advantageous. The Hon. Newton Fellows, in Devonshire, has been at very great expence, it is said, in erecting a threshing-mill connected with one for grinding, both of which are wrought by a never-failing stream of water. The power of this mill or machine is said to be calculated as equal to sixteen horses. And together with its power and capability for threshing, winnowing, and dressing every kind of corn, the pair of stones for grinding attached to it are about four feet in diameter, to which a bolting-machine or apparatus is added.

In working, this threshing-machine is capable of discharging about twenty-five bushels of wheat, and nearly forty bushels of barley or oats in the hour. The barn, or place where the machine is placed, being filled with the wheat or other corn; the manual assistance for performing the business is distributed through it in this manner: one man and two women for unbinding the sheaves of corn and feeding the rollers, which last are grooved and divided into lengths of six or eight inches: on the straw being discharged from the machine, one person attends to shake it well over a large open screen, whence it is tossed over to another person, who removes it out of the way. At and under each of the winnowing-machines, sieves are placed to receive the grain coming directly from the machine, which is then put into the hopper of the fan of the second winnowing-machine, from which it is again received into another sieve, and thence discharged into the hopper for grinding, for the market, or for other purposes: in passing through this little fan, such a separation takes place as completely to divide the head from the tail corn. A cylindrical pearl-barley machine or apparatus is also applied and used to cleanse the wad of its smut, and thus by taking off the downy end of the grain, a much finer sample of both wheat and flour is obtained. This is preferred to the brush apparatus; for although that may cleanse the body of the grain, it will not carry off the down from its end, which may reasonably be supposed to contain the germ of smut, or to form the nest of other animal-culæ equally injurious to such grain when used as seed on lands.

There is in this machine only one labouring man employed to five women, which is an advantage of great importance in many situations. The introduction of such machinery as this is therefore of great benefit in bettering and improving the rural condition of the country.

But, besides machines of this sort being constructed for performing the different operations of threshing, winnowing, grinding, and bolting, they have sometimes contrivances for other purposes, as an iron hopper axis for grinding apples; and a contrivance for shelling clover seed, and the haddock of wheat. These two additions belong to a threshing-machine of Mr. Vinns in the above district; and some others are occasionally met with in other places which are a little different in their nature, but unnecessary to be here described.

In the general construction of these machines, they are commonly,

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commonly, as has been seen, made of two descriptions, large and small kinds; the former of which probably not only perform their work more expeditiously, but in a more perfect manner, though their expence is an objection to them on small farms. They require very different strength of teams or other powers in working them, according to their sizes, the nature of their construction, and other circumstances.

It is stated, that in some large machines of this kind, the rollers take in about three hundred inches of grain in a minute. The medium length of the straw being estimated at about thirty inches, and supposing half a sheaf to be introduced into the machine at a time, the whole sheaf will be equal to sixty inches, and the machine, when supplied with a middling quantity of water, will thresh five sheaves in a minute. But in respect to the performance of these mills, much must depend on the attention with which they are fed, as a small neglect in this point will make a very considerable difference in the quantity of work that is performed in a given time.

In regard to the expence of these machines, it must depend upon the size and power which they possess of performing work, the number of other operations which they perform at the same time, and whether they be fixed or moveable. According to some persons well informed on the subject, a fixed mill that requires the power of two or three horses, will cost from sixty to a hundred guineas. This will thresh about fifteen quarters of wheat, and from that to twenty of barley, oats, peas or beans in the course of eight or nine hours.

It is noticed, that the only defect of machines worked by wind, upon their first introduction, consisted in the risk to which they were exposed, by flopping them to take in the sails, which could scarcely be done during a brisk gale: in that way it sometimes happened, that when the wind freshened considerably after the machine was set a going, either the sails were torn to pieces, or the arms broken off. That defect, however, is now remedied by a late invention of Mr. Mickle, by which the whole sails can be taken in, or let out, in less than half a minute, merely by a person pulling a rope within the house; by this contrivance the sails are, with ease and expedition, proportioned to any degree of wind, an uniform motion is produced, and all danger of straining or hurting the machine is avoided.

It is further observed, that the number of hands required for working one of these machines, is from five to six; but that this depends greatly on the construction of the machine, some of them being so contrived, that the work can be performed with much fewer hands.

It is, however, noticed in the Agricultural Survey of Norfolk, that a machine erected by Mr. Johnson, at Lempston, appears to be one of the best, if not the very best, of the larger kind that has yet been met with. The movements in it are uncommonly smooth. It requires from six to eight horses, six men, and one woman; it threshes, without any question, much cleaner than the flail, and, without any doubt, cheaper. To bring it to its present perfection, as he was determined to carry his point, he never stopped till it worked to his mind; and having completed it, the repairs since have been quite trifling. The common complaint of their being always out of order is attributed to original errors or inattention in the construction of them. The arrangement is excellent, it is said, in this machine, for disposing of the chaff, colder, straw, and corn, at once, in their respective places, without any confusion or after-removals; and it takes up a very small part of a barn. It was built by Mr. Wigful of Lynn.

Mr. Whiting, of Fring, has also a large threshing-mill, built by Mr. Fordyce, an engineer from Scotland. It cost him 200*l.*; is worked by six horses; threshes twenty-four coombs of wheat in the day, fifty-five of barley, and from sixty-three to eighty-four of oats. It has five beaters on the drum-wheel, and the fluted segment of a cylinder which covers the drum in two parts, with an unfluted plate between them, which is raised or sunk by a short lever: this is a guard against stones getting in. In another circumstance also it is singular; there is a long platform, with a rolling cloth bottom: the whole raised or sunk at pleasure, for delivering the corn, across the floor space of the barn, from the goff in which the corn is stacked, to the other end in which the mill is built; which saves much labour, and works to his satisfaction.

The horse-wheel is here upon a different construction from the common ones, working by a cogged-wheel of small diameter below, instead of above the horses; and the communicating spindle under their path; but it is said to be hard work.

And Mr. Coke, of Holkham, is stated to have a very large machine, which cost about 600*l.* Besides threshing, it grinds corn, works two chaff-cutters, and breaks oil-cake. It threshes sixty-four coombs a day.

Mr. Reeves, of Heverland, has a threshing-mill which is, the writer thinks, still nearer to perfection than any other he has seen; it was made by Ashey, works with two or three horses, and cost a hundred guineas. He found it at work, threshing oats; it does for barley as well as for any other grain, threshing thirty-two coombs in a day of seven hours and a half; more of oats; forty of peas; and thirty of wheat: its day's work of wheat, threshed the day before he saw it, was thirty-one coombs, which were standing sacked in the barn. It varies considerably in the beating-drum cylinder from the others he has seen, it being of a much larger diameter, and has eleven beaters.

At Brightwell-Grove, in Oxfordshire, according to the Agricultural Report of that district, there is a threshing-machine, belonging to Mr. Lowndes, which was constructed by Rastrick, and in which there is some novelty of contrivance: it works by means of four horses: the drum-wheel, in this case, is three feet and a half in diameter, makes two hundred and sixty revolutions in a minute, and, having sixteen beaters, it gives 4160 strokes in that time: there is a rake with four sets of teeth which takes the straw, and delivers it to a second drum-beating cylinder two feet in diameter. This drum is termed the dresser, and turning in an opposite direction to the motion of the straw, beats it down, and in its descent strikes it against a circular board, faced with bars shod with iron, through the space of eighteen inches, by which the straw receives several additional strokes, which, it is conceived, have a great effect in dislodging that corn which has not been completely separated in passing the principal drum. This is the addition not usual in these machines. These are wrought four hours at a time, in which eight quarters of wheat are threshed out. Every thing is threshed perfectly clean; and the straw is not broken more than by the flail. Twelve quarters of barley are threshed in four hours, and sixteen have been done in that length of time. The horses, in this machine, are not attached in the draught, in the manner which resembles pushing, by advancing with the lever before them, but in the common drawing method, with the lever behind them, in which way they are supposed by some to do the work much better.

This machine was seen to thresh forty-three sheaves in ten minutes. It dresses at the same time; and there is a chaff-cutter,

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cutter, as well as a corn grinding-mill with stones, for farm use, attached, and wrought or not, at pleasure.

It is perhaps only in places situated in the immediate vicinity of a colliery, and where, from the cheapness of fuel, they are capable of being worked at a very trifling expence, that steam can be had recourse to as the moving power of these machines. See STEAM, and STEAM-Engine.

With regard to small machines, it is said in the East Lothian Agricultural Report, that they have been introduced there, upon a reduced scale, at a price so low as 40*l.*: that these small machines, having little work to do, and that little being, in general, done slowly, answer the purpose tolerably well; but though cheaper in the first instance, they are, in the end, more expensive than larger ones, a certain degree of strength being absolutely requisite to do the work perfectly. If the parts of the machine are below that degree of strength, the work is either ill done, or the machine is destroyed, by being exerted above what it is able to bear.

The writer of the Essex Agricultural Survey too states, that in that district at present many are made by Balls of Norfolk, the price fifty guineas, and do their work very clean and well for all sorts of corn, but do not dress. They have been applied to white clover, and have done it to the satisfaction of the growers, by passing it through twice or thrice. In one erected by Mr. Vaizey, which is worked by horses, one man feeds, two supply, a boy drives, and two men clear away the straw. He has threshed sixty quarters of wheat with it in eighteen hours. It cost 52*l.* 10*s.*, and 10*l.* putting up; the shed added about 20*l.*, two winnowing machines 15*l.* 15*s.*; in all, complete, about 100*l.* But in this a greater number of horses are used than are noticed above. The owner has no fault to find with its performance, but is very well satisfied with it. He has applied it to cobbing white clover with great success; by passing it thrice through the mill, he got from three jags, seven bushels of clean seed in four hours. And one built by Dickson of Ipswich, for Mr. Sanxter, goes with two or four horses, and cost fifty guineas. It is supposed that it will thresh twenty quarters of wheat *per diem*. But it is now fifty-five guineas, put up and ready to work. Two horses work it, without hard labour. The last year's wheat, which was very badly threshed at 7*s.* *per* quarter, was done by this machine perfectly well. Also at Little Wakering, Dr. Asplin has a machine which the writer saw working with one horse, which moved with great ease, driven by a little girl; one man and two boys work it, and it does three quarters of wheat in a day. The writer examined the straw for about a quarter of an hour, and did not find a single kernel in it. The price is sixty guineas. The construction in this machine varies from the others he has seen, in the wheels which communicate the motion. The doctor threshes only wheat with it, though it will do for all sorts of grain. He thinks it answers greatly, and is perfectly satisfied with it. It was made by Turbot, Bankside, Westminster, but they are now made by Jones, Clement's-Lane, Clare-market, London.

There are many other persons who put up these machines at an equally reasonable rate, and so as to work with much perfection.

Where machines of this sort cost about one hundred guineas, the annual expence in interest of capital and repairs cannot be more than from 10*l.* to 12*l.* at most, except in the expences of teams and the labour of the persons employed in the execution of the business and work about them.

The expensive machines which have rollers for rubbing

out the grain instead of beaters, are thought in general to perform the business in the most perfect manner, though they require more power to work them.

It is, however, thought by some to be utterly impossible to build threshing-machines which will do justice to the owners for any such sum as 50*l.*, or thereabouts, as their durability and success depend materially on their firmness, strength, solidity, and other circumstances of the same nature, which are by no means attainable for any such money. Yet many of these small machines of one or two horse power, are said to perform their work well, and at the rate of six quarters of wheat, and the relative proportions of other sorts of grain, in the course of the day. They are stated to be made in several different districts, at the prices of from thirty to fifty guineas, so as to thresh well at nearly the above rate, and to have, in some instances, other additions, such as chaff-cutters, &c. made to them. In particular cases, they are thought not to break the wheat-straw so much as the flail; and though wheat and beans are mostly well threshed by them, barley is under the necessity of being often twice passed through such machines, as seen above. They do not dress in general; but sometimes head feed clover in a pretty perfect manner, as noticed already.

Small threshing-machines have likewise been constructed so as to be wrought by hand, in some districts, both in the northern and southern parts of the kingdom, and been ascertained by some to perform their work in a clean and satisfactory manner; but from their mostly wanting that degree of velocity, in being wrought in this manner, which is essential to good work of this kind, they have not yet become in any way general. Indeed, in some districts in the south, the working of them by the hand not being found to succeed well in actual practice, the usual feeding rollers have been applied with the horse-tackle, at the additional charge of about 20*l.*, which has enabled them, it is said, to do the work properly, and in an easy manner, even by the power of one horse. Where the teeth of the iron wheels in such machines have been found too fine for the increased force made use of in this way, vertical wooden wheels and pinions have been put in their place, which have contributed to the strength and preserved the simplicity of the machinery.

Threshing-machines have now been known, and in some measure employed, in the northern parts of this country for more than half a century, and are at present very general in those that are any way improved; but in the more southern districts, they have only been attended to, in any considerable degree, for the space of the last thirty or forty years, yet their use and application are fast becoming general among the more extensive farmers whose farms are of the arable kind. In short, it is not improbable but that in a little time the machine will be the most prevalent method of threshing out corn. And it has been suggested, that parish machines of this nature, in central situations, would perhaps not be less useful or convenient than parish mills, while, at the same time, they might be easily so regulated as to be rendered of great general benefit to the community, as well as advantageous in the way of private speculation to individuals. Something of this sort is said to be already the case in some districts of the North, and would, it is believed, be desirable in all, for the convenience and accommodation of the small farmer; as the same conveyance that brought the corn to be threshed, might take back the straw and grain, and in this way little waste of labour or time be sustained, while the saving would be considerable and certain.

It may be noticed also, that in all cases where threshing-machines are made use of, they should be well suited to the

extent of the farms, and be erected in such a manner as to be convenient for having the contents of the stacks brought to them. In this view it has been suggested, in the Report on Agriculture for the West Riding of Yorkshire, that the barns to which they are attached should extend into the yards in which the stacks are contained; as in that way the labour and time will be considerably lessened of supplying them with corn in the straw for being threshed. And it has been justly remarked, by an intelligent promoter of agricultural improvements, that this machine has not been attended with one-half of the advantage which might have flowed from so useful a discovery, for want of combining the use of it with the various connected circumstances of the farm-yard. The business of stacking corn, for instance, must, it is conceived, receive an entirely new arrangement in consequence of building a threshing-mill or machine. By means of no other additional expence than that of an iron railway, and placing the stacks on frames resting on block-wheels, two feet in diameter, a very considerable annual expence in time and labour must, it is supposed, be saved in carting stacks to the barns, in loss of corn, and in waiting for good weather, as well as in the saving of threshing by flails, and all the attendant evils of pilfering and leaving corn in the straw. This is a material object, which it is thought cannot receive too much attention from both landlord and tenant. It is contended that there cannot be the smallest doubt of the propriety or profit of having one of these machines fixed in the principal farm-yard. But that where the farm is large, and stacks consequently scattered over various fields or parts of it, then it may be right to have a moveable one also; but so many operations are wanting at home, that one should certainly be fixed. The circular form of the railway upon which the stacks are brought to the mill or machine, is considered necessary in such cases, as being the only one which permits a choice of any particular stack to thresh, without waiting for all or many others being done before it can be got at; but a straight line leading to and past the mill or machine is admissible, except for this circumstance, though much inferior, in some other points, to the circular form. In forming this plan, a sort of railway should be so contrived as that a horse or two may be sufficient to draw all common stacks to the mill or machine. And it is directed that the wooden stumps on which the frame rests should be tinned, or laid in the common manner with brass latten, which is more durable than common tin, to keep out rats. Also, that as the power applied to the threshing-mill in other ways is at hand, and applicable also to the above sort of work of drawing the stacks, it may be used for the purpose in many cases.

**THRESHING-Mill Barn or Building**, that sort of barn, shed, or other building which is calculated for receiving, or which contains this kind of mill or machine.

In this intention, an upper floor, raised eight, nine, or ten feet from the ground, in proportion to the height or size of the animals, and the arrangement of the machinery which is to be employed, will be required, and which should reach from end to end of the barn or building, as a repository for the unthreshed corn, which should be there lodged and deposited, at leisure times, from the stack-yard, or other places, in order to be ready to feed the mill or machine with from this upper floor. The ground-floor should contain the large mill-wheel, and a horse-path round it, all the lower parts of the machinery, a dressing-room for the grain, and a wide open space for straw of different sorts, which is there to be piled up, ready for the cattle-sheds, on each side of this repository of fodder.

The expences of these prepared barns or buildings, will

probably not only be much lessened, but wholly done away, in some cases, by the use of the threshing stack farm-yard, which has been described in speaking of the mills or machines for this use, and much convenience and accommodation be thereby gained to the farmer in the dispatch of the business, &c.

On the whole, by these means the labouring teams and hands will be enabled to perform the work of threshing at such wet, stormy, and leisure periods as will render it the least troublesome and expensive to the farmer. See **THRESHING-Machine**.

**THRESHOLD POINT**, in *Geography*, a cape on the north-west coast of New Guinea. S. lat. 0° 37'. E. long. 132°.

**THREX**, among the Romans. See **THRACES**.

**THRIFT**, in *Botany*. See **STATICE**.

**THRIHING**. See **TRIHING**.

**THRIMSA**, in *Antiquity*, a silver coin, the value of which has occasioned a variety of conjectures. Lambard, who gave the first estimate of it, makes it a three-shilling piece, in which opinion he is followed by sir Henry Spelman. Bishop Nicholson apprehends, that it was the name of their common coin, and that the thrimsa, sceata, and penny, were all of them the same. Somner, from the import of the word, and the value given to the thrimsa in the Saxon laws, rates it at three-pence. Selden, Brady, and Hickes, are of opinion, that this coin was either the last tremissis of the Franks and Germans, and consequently four-pence, or the third part of the Saxon shilling, *i. e.* three halfpence and one-third of a halfpenny in their money. Mr. Clarke adopts, and endeavours to establish the opinion of Somner, who observed, from the laws of Athelstan, that the price of a thane's life was, by the Angli, valued at 2000 thrimsas, which, by the Mercian estimate, was 1200 shillings; and if each of these sums denotes the same value, which is probable, the thrimsa must be to the shilling as 2000 is to 1200, or three parts in five of a Saxon shilling, *i. e.* three-pence.

The thrimsa was first coined in the reigns before Athelstan, during their greater affluence in cash, and designed merely for the convenience of exchange, as the most proper division that could be made in their money without a fraction, between the shilling and the penny. But when the shilling was reduced, it was of little use, and by degrees entirely laid aside.

Dr. Hickes observes, that the method of computing by thrimsas was chiefly used in the more mercantile parts of this kingdom, among the East and West and South Saxons, and possibly coined only among them; for it appears that the inland provinces, the Mercians, reckoned generally by the shilling. Clarke's Conn. of the Roman, Saxon, and English Coins, p. 229, &c.

**THRIN**, in *Geography*, a river of Norfolk, which joins the Yare at Yarmouth.

**THRINAX**, in *Botany*, θριναξ, a fan, in allusion to the form of its leaves; a name bestowed by the younger Linnaeus on the little Fan Palm of Jamaica, when he first distinguished this plant generically from *Corypha*, to which it had been referred by Browne. To that genus it is, as Swartz observes, very closely allied, differing chiefly in the want of a corolla.—Swartz Prodr. 57. Ind. Occ. v. 1. 613. t. 13. Schreb. Gen. 772. Willd. Sp. Pl. v. 2. 202. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 307.—Class and order, *Hexandria Monogynia*. Nat. Ord. *Palme*.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, minute, hemispherical, with six small, erect, marginal teeth. *Cor.* none. *Stam.* Filaments six, erect, equal, thread-shaped, about

about twice the length of the calyx, inserted at the base of the germen; anthers terminal, erect, linear, longer than the filaments, cloven at each end. *Pist.* Germen half immersed in the base of the calyx, ovate; style cylindrical, thickish, erect, the length of the filaments; stigma very large, funnel-shaped, oblique, of a single, dilated, ovate, rather tumid, lip, finely crenate at the margin, rarely accompanied by another lip. *Peric.* Drupa small, globular, naked, rather dry. *Seed.* Nut solitary, large, globose, brittle, of one cell, with a solitary kernel.

*Eff. Ch.* Calyx with six teeth. Corolla none. Stigma funnel-shaped, oblique. Drupa globular, with a single seed.

1. *Th. parviflora.* Small Jamaica Fan Palm; Palmetto Royal; or Palmetto Thatch. Willd. n. 1. Ait. n. 1.—Native of the sea-coast, and other barren dry situations, in Jamaica and Hispaniola. *Swartz.* The stem is from ten to twenty feet high, unarmed; tumid at the base. Leaves collected about the top, stalked, from one to two feet long, palmate, plaited like a fan; their segments lanceolate, ribbed and streaked, rigid, nearly equal. *Footstalks* longer than the leaves, roundish, somewhat compressed, smooth, flexible, unarmed. *General Sheath* compound. *Flower-stalk* terminal, solitary, nearly erect, two or three feet long, panicled, imbricated with *partial sheaths*, or *bracteas*; its branches alternate, subdivided, spreading; the ultimate ones opposite or ternate, crossing each other. *Flowers* stalked, opposite or ternate, small, perfect. *Anthers* yellow.—Brown says, Hist. of Jamaica, 191, this tree covers whole fields in many parts of that island, thriving better on the rocky hills, than on the low moist plains near the sea. The copious little berries serve as food for birds and wild beasts. The trunk, seldom more than four or five inches in diameter, ten or fourteen feet high, is called the *Thatch-pole*, and is much used for piles in wharfs and other buildings made in the sea; for it stands the water well, and is never corroded or touched by worms. The split footstalks make baskets, bow-strings, ropes, &c. being very strong and tough. The leaves are called *thatch*, and are used as such, for outhouses especially, being found to resist the weather for many years. Such coverings of buildings have only the inconvenience of harbouring rats or other vermin, which prevents their general use.

THRINCIA, so called by Roth, from *θρι, κος*, the *battlement of a wall*, to which he compares the seed-crown of the marginal florets. The Italian name *Trinciarella*, used by Camerarius, *Hort. Med.* 173, for *Hyoseris radiata*, may, as Dr. Ross supposes, have a similar origin; but it comes directly from the Italian verb *trinciare*, to cut, alluding to the remarkable segments of the leaf in that plant.

This genus of *Thrinicia* consists of two species, *Leontodon hirtum* of Linæus, and *Hyoseris taraxacoides* of Villars, excluding the synonyms of the latter. We see no occasion to separate them from *Apargia* of Schreber and Willdenow, the *Hedynois* of Hudson. Having, in the *Prodr. Fl. Græc.* v. 2. 142, adopted HEDYNOIS; and in p. 130 of the same volume, APARGIA; we refer the reader to the former in its proper place, and shall here introduce the latter, with its full characters and synonyms.

APARGIA, *Απαργία*, an ancient Greek name, with whose original meaning, or application, we are unacquainted. Dalechamp has applied it to something of the *Hieracium* kind; and Schreber, after Scopoli, to the genus now before us, with which we hope it will remain.—Schreb. Gen. 527. Willd. Sp. Pl. v. 3. 1547. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 445. Sm. Prodr. Fl. Græc. Sibth. v. 2. 130. Compend. Fl. Brit. ed. 2. 117. Marsch. a Bieberff. Cæcaf. v. 2. 247. (*Hedynois*; Hudf. Fl. Angl. 340.

Sm. Fl. Brit. 823. Leontodon; Juss. 170. Thrinicia, Roth. Catal. v. 1. 97. Willd. Sp. Pl. v. 3. 1554. Ait. Hort. Kew. v. 4. 447. Virea; Gærtn. t. 159.)—Class and order, *Syngenesia Polygamia-aqualis*. Nat. Ord. *Compositæ gemiflosculosæ*, Linn. *Cichoraceæ*, Juss.

*Gen. Ch.* Common Calyx oblong, permanent, imbricated, of several linear, parallel, unequal, longitudinal, incumbent scales; those at the base very small. *Cor.* compound, imbricated, uniform; the florets numerous, all perfect, equal, monopetalous, ligulate, linear, abrupt, with five teeth. *Stam.* Filaments five, capillary, very short; anthers united into a cylindrical tube. *Pist.* Germen nearly obovate; style thread-shaped, the length of the stamens; stigmas two, recurved. *Peric.* none, except the permanent, straight calyx, at length reflexed. *Seeds* solitary, oblong, striated, crowned with sessile feathery down, somewhat chaffy in the lower part, and often unequal in the marginal florets; somewhat stalked in the central ones, frequently accompanied by shorter hairs or plumes. *Recept.* dotted, naked, or very slightly hairy.

*Eff. Ch.* Receptacle naked, dotted. Seed-down feathery, sessile, unequal. Calyx imbricated, with small scattered scales at the base.

This genus, though very natural and well defined, has the general habit of *Hedynois*, or of *Hieracium*, agreeing with the latter in having some caulescent species, though in most the *flower-stalks* are radical and single-flowered. The leaves are variously toothed or sinuated, mostly hairy, rarely villos. *Flowers* of a full yellow. *Root*, except in our thirteenth species, perennial, tuberous. We adopt the English name of Hawk-bit from Petiver.

1. *A. aurantiaca.* Orange-coloured Hawk-bit. Willd. n. 1. "Waldst. et Kitaib. Hung."—"Stalk radical, single-flowered, naked; tumid and hairy in the upper part. Calyx hispid. Leaves lanceolate-oblong, slightly toothed."—Found on the lofty mountains of Hungary. Leaves three or four inches long, smooth. Stalk six inches high, smooth, except just below the flower. Calyx clothed with rigid blackish hairs. Corolla orange-coloured. Seed-down sessile, feathery. It differs from the next in having no scales on the stalk, which is more tumid in its upper part; very smooth leaves; and a different-coloured flower. Willd.

2. *A. alpina.* Alpine Hawk-bit. Host. Syn. 423. Willd. n. 2. (*Leontodon alpinum*; Jacq. Austr. t. 93. L. pyrenaicum; Gouan. Illustr. 55. t. 22. f. 1, 2. Hedynois pyrenaicum; Villars Dauph. v. 3. 78, from the author. Picris faxatilis; Allion. Pedem. v. 1. 211. t. 14. f. 4. Taraxacum foliis integris dentatis, calyce hispido, pappo plumoso; Hall. Helvet. ed. 1. 741.)—Stalk radical, solitary, single-flowered, scaly; slightly tumid, and somewhat hairy, at the top. Calyx hispid. Leaves lanceolate-oblong, slightly toothed, somewhat hairy.—Native of grassy pastures, on the Alps of Austria, Switzerland, Dauphiny, and Italy. Haller found it on mount St. Gothard, Schleicher on mount Fouly, and the late Mr. Davall on St. Bernard. Our synonym of Haller's first edition, misquoted by Willdenow, rests on the authority of Allioni. We do not find the plant in his subsequent publications. The root is tuberous, perennial, with long fibres. Leaves from three to eight, radical, stalked, erect, obtuse, two or three inches long; tapering at the base; distantly toothed about the middle or lower part: rough, with shaggy short hairs, particularly about their rib and footstalk; which latter is sometimes red or purple. Flower-stalk from three to ten inches high, slender, erect, bearing a few scattered linear scales, and one yellow flower, hardly so big as our common Dandelion, whose calyx-scales are narrow, black with shaggy hairs.

## THRINCI A.

3. *A. crocea*. Saffron-coloured Hawk-bit. Willd. n. 3. (*Leontodon croceum*; Haenke in Jacq. Coll. v. 2. 16.)—"Stalk radical, solitary, single-flowered, slightly scaly; tumid and hairy above. Calyx hispid. Leaves smooth, runcinate, with a triangular terminal lobe."—Gathered by Haenke on the alpine heights of Judenberg, in Upper Stiria, where it inhabits dry, open, barren pastures, but is elsewhere rarely to be seen. This is said by Willdenow to be like the preceding, but different in the above-described figure of its leaves, which are only sometimes hairy. Flower an inch and half, or two inches, in diameter, very handsome, and readily distinguished from all the surrounding species of its own tribe, by its colour, which is that of tincture of saffron.

4. *A. basilis*. Shining Spear-leaved Hawk-bit. Hofst. Syn. 423. Willd. n. 4. Ait. n. 1. (*Leontodon hastile*; Linn. Sp. Pl. 1123. Jacq. Austr. t. 164. L. protheiforme B & C; Villars Dauph. v. 3. 87. Picris, n. 26; Hall. Helvet. v. 1. 12.)—Stalks radical, single-flowered, smooth as well as the calyx. Leaves obovato-lanceolate, smooth, with numerous slightly hooked teeth.—Native of the south of Europe; very abundant in Switzerland. The leaves are often a foot long, tapering at the base into purplish, flat, winged footstalks; their surface smooth, even, and somewhat glaucous; their margin cut into many deep, acute, triangular teeth, partly hooked backward. Stalks several, round, very smooth, glaucous, very rarely divided, twelve or eighteen inches high. Flower bright yellow, an inch and half wide, with scarcely any perceptible hairs on the calyx; drooping when in bud. Sometimes the flower-stalks bear a few linear distant scales.

5. *A. dubia*. Doubtful Hawk-bit. Willd. n. 5.—"Stalk single-flowered, radical, nearly naked; hairy, as well as the calyx, above. Leaves lanceolate, toothed at the base, slightly clothed with forked hairs."—Communicated to Willdenow by Hoppe, from the Salzburg alps, under the above name, which seems to us but too well applied. We have not indeed seen a specimen of this plant. Willdenow describes it as intermediate between the last and *A. bifida*. The stalks are mostly furnished with one small scale, and are tumid under the flower, whose calyx, as well as the upper part of the stalk, are beset with short forked hairs. The leaves seem smooth at first sight, but bear scattered, white, forked hairs.

6. *A. tuberosa*. Knotty-rooted Hawk-bit. Willd. n. 6. Ait. n. 2. Sm. Fl. Græc. Sibth. t. 797, unpubl. (*Leontodon tuberosum*; Linn. Sp. Pl. 1123. *Dens leonis bulbosus*; Ger. Em. 290. *Chondrilla altera* Dioscoridis, &c.; Lob. Ic. 232.)—Stalks radical, single-flowered, naked, somewhat hairy. Calyx hairy. Leaves pinnatifid, runcinate, somewhat lyrate, rough with forked hairs. Root of many ovate tapering knobs.—Native of the south of Europe and the Levant; very common in the sandy meadows of Greece, Cyprus, and Zante. The modern Greeks name it *radika*, or *radisb*; and it may be, as some old botanists have thought, the *κονδριλλη ἑλίφα* of Dioscorides, but this is hard to determine. The perennial root is a cluster of sessile ovate knobs, above an inch long, tapering into radicles. Leaves numerous, spreading, dark green, obtuse, either simply runcinate, with a large terminal lobe, or deeply, sometimes interruptedly, pinnatifid, and bluntly toothed. Flower-stalks several, a span high, ascending, striated, more or less hairy; purple, like the footstalks, at their base. Calyx slender, with acute scales. Flowers above an inch wide, full yellow; red underneath.

7. *A. incana*. Hoary Hawk-bit. Scop. Carn. v. 2. 113. Willd. n. 7. Ait. n. 3. (*Hieracium incanum*;

Jacq. Austr. t. 287. Linn. Sp. Pl. ed. 1. 799. *H. sextum montanum*; Cluf. Hist. v. 2. 141. Ger. Em. 302. *Leontodon hispidum* β; Linn. Sp. Pl. ed. 2. 1124.)—Stalks radical, single-flowered, almost naked, hoary as well as the calyx. Leaves lanceolate, erect, very minutely and sparingly toothed, hoary with starry hairs.—Found on hills and mountains in Germany, Switzerland, Carniola and France. The root is long and woody, divided at the crown, where it bears several tufts of straight, upright, more or less acute, very hoary, leaves, tapering at the base, from three to five inches long, with a few little, marginal, glandular teeth. Stalks often solitary in each tuft, a foot high, swelling at the top. Flowers light yellow, an inch and a half broad. Calyx-scales narrow, acute. The uniformly entire leaves, though beset with a few glandular teeth, and the structure of most other parts, when minutely examined, render this plant sufficiently distinct from *A. bifida*, hereafter described, with which Linnæus subsequently confounded it as a variety.

8. *A. Taraxaci*. Dandelion-leaved Hawk-bit. Willd. n. 8. Ait. n. 4. Compend. Fl. Brit. n. 3. (*Hedypnois Taraxaci*; Villars Dauph. v. 3. 80. t. 26. Fl. Brit. 825. Engl. Bot. t. 1109. *Hieracium Taraxaci*; Linn. Sp. Pl. 1125. Retz. Obf. fasc. 4. 30. t. 2. Lightf. Scot. 435. Picris n. 27; Hall. Hist. v. 1. 12. *P. Taraxaci*; Allion. Ped. v. 1. 211. t. 31. f. t.)—Stalks radical, mostly single-flowered; tumid and hairy at the top. Leaves smooth, with recurved teeth. Calyx hairy.—Native of watery pastures on the loftiest mountains of Lapland, Scotland, Wales, Switzerland, Savoy, and Dauphiny, flowering in July or August. Root abrupt, with long lateral simple fibres. Herb very variable in the breadth of its leaves, as well as the number, height and luxuriance of its flower-stalks. The former are either lanceolate, and almost linear, or spatulate and obovate, sharp or blunt, from two to four inches long, with shallow or very deep, always runcinate, teeth. The latter are ascending or erect, solitary or in pairs, sometimes, though rarely, divided, naked or furnished with a few linear scales, shaggy with black hairs at the top, as is likewise the broad and thick calyx. Flowers an inch broad, or more, of a full yellow, with brownish terminal feet. Germen furmounted with a taper neck, like a stalk, but as the seed swells, this appearance vanishes, and the feathery down is truly sessile. Receptacle naked. Willdenow justly remarks, that Gouan's synonym is misapplied to this species in the *Fl. Brit.* We have now quoted it more correctly under our second *A. alpina*, to which some of the slender varieties of the present bear a great resemblance. Solander, as well as Linnæus, thought this plant a mule between *Hieracium alpinum* and *Leontodon Taraxacum*, merely because its flowers resembled one, and its leaves the other. The generic character differs from both.

9. *A. autumnalis*. Autumnal Hawk-bit. Hoffm. Germ. for 1791. 274. Willd. n. 9. Ait. n. 5. Compend. Fl. Brit. n. 4. (*Hedypnois autumnalis*; Fl. Brit. n. 4. Engl. Bot. t. 830. *Leontodon autumnale*; Linn. Sp. Pl. 1123. *Hieracium minus*; Fuchs Hist. 320. *H. minus*, five leporium; Ger. Em. 296.)—Stalks radical, branched; their ultimate divisions scaly. Leaves lanceolate, toothed, or pinnatifid, smoothish.—Native of meadows and pastures throughout Europe, flowering in autumn; very common in Britain. The root is abrupt, with very long and copious fibres. Leaves numerous, variously and unequally pinnatifid, or merely toothed, rarely a little rough or shaggy, oblique, or somewhat serpentine, in their general form or position. General stalks one or more, a foot or two in height, spreading, curved and zigzag, alternately branched, not quite without pubescence, terminating in a few long scaly

*partial*

## THRINCIA.

*partial stalks*, which are hollow, and each contains a peculiar tuft of very white cotton, remarked by the Rev. Mr. Holme. *Calyx*, and top of each *stalk*, a little downy. *Flowers* bright lemon-coloured, hardly an inch broad, often reddish on the outside. *Seeds* slender, all crowned with feathery down. Sometimes the *flowers* are prolific, like the Hen-and-chicken Daisy.

10. *A. crispa*. Curled Hawk-bit. Willd. n. 10. Ait. n. 6. (Leontodon crispum; Villars Dauph. v. 3. 84. t. 25. Hieracium alterum faxatile montanum; Column. Ecphr. 244. t. 243. H. parvum hirtum, caule aphylo, crispum ubi siccatum; Banh. Hist. v. 2. 1038.)—Stalks radical, almost naked, single-flowered, hairy as well as the calyx. Leaves with various divaricated teeth and segments, rough with dense three-forked hairs. Seeds with a rough elongated beak.—Native of rocks in Dauphiny, Switzerland, and Italy.—The *root* is said to be very long, thrusting itself deep into the scarcely visible clefts of large rocks, and sending forth many long, simple, lateral fibres. *Leaves* numerous, in dense spreading tufts, from two to four inches, Columna says more than six, in length, pinnatifid in a rather lyrate manner, some of their segments or teeth turned various ways, especially, as J. Bauhin observes, when dry; they are densely clothed, on both sides, with prominent hairs, whose peculiarly white tips have three or more spreading forks or points. *Flower-stalks* ascending, a span high, furrowed, bearing a few linear scales near the top. *Flower* full an inch broad. *Seeds* uniform, each terminating in a long, tapering, brown, minutely rough beak, which looks like a stalk to the dense feathery down. This species comes very near the following, but appears to be essentially distinguished by the beak of the seeds. Villars confounds its synonyms with those of *A. hirta*, which differs very materially in having a scaly short crown to its marginal seeds, as will hereafter be described.

11. *A. hispida*. Rough Hawk-bit. Willd. n. 11. Ait. n. 7. Compend. Fl. Brit. n. 1. (Hedypnois hispida; Fl. Brit. n. 1. Engl. Bot. t. 554. Leontodon hispidum; Linn. Sp. Pl. 1124. Curt. Lond. fasc. 5. t. 56. Fl. Dan. t. 862. Hieracium dentis leonis folio, hirtum; Ger. Em. 303.)—Stalks radical, naked, single-flowered. Leaves with reversed teeth, rough. Florets hairy at their orifice; glandular at the tip. Seeds scarcely beaked.—Very common in meadows, pastures, and waste ground, throughout Europe, from Sweden to Greece, flowering in summer. The *root* is tapering, zigzag, long and slender. *Leaves* oblong, more or less deeply toothed, or in some measure pinnatifid, their teeth acute, pointing downwards; they are much less densely hairy than those of the last, their hairs generally simply forked only; but we are aware of the uncertainty of this character. *Stalks* several, upright, striated, clothed with similar hairs. *Flowers* drooping while in bud; afterwards erect, bright yellow, an inch and half broad. *Calyx* hairy; its outer scales lax and scattered. *Florets* with a tuft of long yellow erect hairs, at the top of their tube externally; their summit terminates in five teeth, at the back of each of which Mr. Sowerby first detected a small triangular cluster of brown glands. These two characters serve admirably to distinguish the present species from every other British one, but the first of them, if not the other, is found in *A. crispa*. The seeds however have not near so long a beak as in that species, and they differ from *A. hirta* in being all uniformly furnished with a feathery crown. It is curious to trace an assertion of the *seed-down* being stalked in this species, published by Willdenow, taken from Haller, on the authority of Reichard. On turning to Haller, n. 25, we find he trusted to Berkhey, who, in his

*Flores Compositi*, t. 6. f. 10, has figured a *seed*, supposed to belong to the plant before us. On examination however its crown proves to consist of simple, not feathery, rays, and therefore it has nothing to do with any *Apargia*. We mention this circumstance, to shew the mischief of taking things for granted; not only in botanical criticism, but any other inquiry of the human mind.

12. *A. hirta*. Deficient Hawk-bit. Hoffm. Germ. for 1791. 274. Compend. Fl. Brit. n. 2. (Thrinicia hirta; Roth. Catal. v. 1. 98. Willd. Sp. Pl. v. 3. 1554. Ait. Hort. Kew. v. 4. 447. Hedypnois hirta; Fl. Brit. n. 2. Engl. Bot. t. 555. Leontodon hirtum; Linn. Sp. Pl. 1123. Curt. Lond. fasc. 6. t. 59. Rhagadiolus n. 7; Hall. Hist. v. 1. 5, with some doubtful synonyms.)—Stalks radical, naked, single-flowered. Leaves toothed, rough. Calyx nearly smooth. Outer row of seeds destitute of down.—Native of gravelly heaths and waste ground throughout Europe. Dr. Sibthorp gathered it, along with our violets and primroses, in Arcadia. Mr. Curtis observes that this species seldom occurs on the same spot with the preceding, of which Mr. Hudson made it a variety. Other botanists have found great difficulty in distinguishing them under all their various appearances, whilst Haller, and more recently Roth and Willdenow, have separated them generically. Linnæus thought the simple hairs of the plant before us afforded a good mark; but this is fallacious. The herbage of both is nearly the same, or at least their varieties closely approach each other. The *flowers* of both droop in the bud, but those of *A. hirta* are the smallest; their *florets* orange beneath, destitute of hairs about the orifice, and of glands at the summit. The most essential difference of all is found in the *seeds* of the circumference, which have no feathery down, but instead thereof a crown of short jagged scales. The *root* is abrupt, or bitten off, not tapering.

13. *A. annua*. Annual Hawk-bit. (Thrinicia hispida; Roth. Catal. v. 1. 99. Willd. Sp. Pl. v. 3. 1555. Hypoferis taraxacoides; Villars Dauph. v. 3. 166. t. 25, excluding the synonyms.)—Stalks radical, naked, single-flowered. Leaves lanceolate, toothed, rough with forked hairs. Calyx hoary and hispid. Outer row of seeds destitute of down: those of the disk beaked.—Native of Spain and France, in sandy ground. The annual fibrous *root* distinguishes this from all the other known species, and especially from the last, with which the short crown of its outer row of seeds agrees. The rest of the seeds however are elongated at the summit into a slender beak, which elevates the feathery down, as on a longish stalk, but is not really such. The rough and hoary calyx, and the brighter green of the leaves, are further differences. The name of *hispida* being preoccupied, see sp. 11, we are obliged to select a new one for the present species.

14. *A. Villarsii*. Villarsian Hawk-bit. Willd. n. 12. (Leontodon hirtum; Villars Dauph. 82. t. 25, excluding the synonyms.)—“Stalks radical, naked, single-flowered, nearly smooth as well as the calyx. Leaves deeply toothed, or pinnatifid, rough with simple awl-shaped bristles.”—Native of dry sunny rocks in Dauphiny. Willdenow, who had a dried specimen, says the leaves are hoary with copious white hairs. We have not seen the plant, nor dare we attempt any illustration of it; Villars having so confounded various synonyms under this and his *Leontodon protuberans*, p. 87. t. 24, that, even with some of his specimens before us, the descriptions are not satisfactory.

15. *A. caucasica*. Caucasian Hawk-bit. Marsch. a Bieberst. Caucal. v. 2. 247.—“Stalk radical, single-flowered, smooth. Calyx hairy. Leaves runcinate, rough, sparingly clothed with simple depressed hairs.”—Native of  
grassy

grassy pastures on the Caucasian alps, flowering in August and September. *Root* perennial, abrupt. *Leaves* with triangular, nearly entire lobes pointing backward, besprinkled on the upper side with decumbent hairs, so sparingly that they seem altogether smooth. *Stalk* longer than the leaves, striated, naked except a minute scale or two; a little tumid and downy under the *calyx*, which is blackish, though hispid with whitish hairs. *Flower* of a full yellow. *Seeds* smooth to the naked eye; their down sessile, feathery. This plant has the habit and stature of *A. hispida*, n. 11, but differs in the want of hairs on the *stalk*, as well as in the form and position of the pubescence of the foliage.

16. *A. coronopifolia*. Bucks-horn-leaved Hawk-bit. Willd. n. 13. (*Leontodon coronopifolium*; Desfont. Atlant. v. 2. 229. t. 214.)—*Stalks* radical, single-flowered, scaly, shorter than the leaves, hairy as well as the *calyx*. *Leaves* pinnatifid, with blunt lobes, rough with forked hairs.—Native of the sandy deserts of Barbary, near Casfa. The whole plant is rough with branched hairs. *Leaves* three or four inches long, spreading on the ground, unequally, but rather regularly, pinnatifid. *Stalks* several, ascending, an inch or two high. *Flowers* yellow, an inch broad.

17. *A. hispanica*. Spanish Hawk-bit. Willd. n. 14. Marsch. a Bieberst. Caucas. v. 2. 248. (*Leontodon hispidum*; Cavan. Ic. v. 2. 39. t. 149, excluding the synonym.)—*Stems* leafy, mostly single-flowered, hairy as well as the *calyx*. *Leaves* oblong-lanceolate, toothed or pinnatifid, rough, with forked hairs.—Native of hilly situations in Spain, flowering the beginning of May. Frequent also in Tauria. This, as Willdenow remarks, differs as much as possible from *A. hispida*. The whole herb is even more rough or bristly than that species. *Stems* six inches high, furnished with lanceolate scales, accompanied by some oblong, obtuse, entire or toothed, *leaves*, an inch or inch and half long. The *radical leaves* are more numerous and longer, tapering at the base, gradually dilated upward, bluntly toothed, or in some degree pinnatifid. *Flowers* terminal, solitary, pale yellow, nearly an inch and half broad. *Calyx* with numerous long, narrow, very hairy scales. The hairs of the stem and other parts are white, sometimes forked.

18. *A. aspera*. Branching Rough Hawk-bit. "Waldst. et Kitaib. Hung. v. 2. 114. t. 110." Willd. n. 15. Ait. n. 8.—*Stem* leafy, somewhat branched, hairy. *Calyx* smooth. *Leaves* lanceolate, runcinate, hairy, with forked bristles.—Native of rocky woods in Hungary, near the baths of Hercules. Very nearly akin to the last, but the more branching *stem*, runcinate *leaves*, and smooth very close-pressed scales of the *calyx*, fringed at the edges only, not lax and hairy, appear sufficient, as Willdenow thinks, to distinguish this species.

19. *A. strigosa*. Bristly Hawk-bit. Marsch. a Bieberst. Caucas. v. 2. 249. (*Scorzonera asperima*; Willd. Sp. Pl. v. 3. 1507. *S. hispida*; Forsk. Ægypt.-Arab. 215.)—"Stem leafy, hispid, bearing one or two flowers. *Calyx* hoary; the margin and keel of its scales fringed with bristles. *Leaves* lanceolate, toothed, hispid, with forked hairs. *Seeds* rough."—Native of dry open places in Iberia, and the eastern part of Caucasus, flowering in June. Forskall found it at Eftac, near Marfeilles. We have already described this under the article SCORZONERA, n. 32. The able author of the *Flora Taurico-Caucasica* says, "the *leaves* and *stems* are extremely hispid; the *calyx* only hoary, except the edges and keels of the scales. *Stems* bearing one or two *leaves*, and from one to three *flowers*, like *A. hispanica*. *Florets* pale yellow; the outermost purple beneath.

*Seeds* brown, linear, tapering much at the top, as in the *Scorzonera*; they are rough with minute prominent points. *Down* feathery. The habit of this plant, and its affinity to *A. hispanica*, n. 17, and *incana*, n. 7, make it rather an *Apargia* than a *Scorzonera*." We have seen no specimen. The regularly imbricated membranous-edged scales of the *calyx* in the latter, and the naked tips of its *seed-down*, are sufficient indications of that genus, and if not found in the present plant, there can be no doubt upon the subject; but of this we are left in ignorance.

20. *A. variegata*. Party-coloured Hawk-bit. Willd. n. 16. (*Hieracium variegatum*; Lamarck Dict. v. 2. 362.)—*Stem* nearly leafless, somewhat branched, shaggy. *Radical leaves* oblong, strongly toothed, hairy towards the edges. *Calyx*-scales spatulate, flat; downy at the base and margin.—Gathered by Commerçon at Monte Video. The *root* seems rather woody. *Stems* several, six inches high, each terminating in one large yellow or orange-coloured *flower*, and bearing several linear acute scales, with the rudiments of branches; but we find none of the pinnatifid stem-leaves mentioned in Lamarck. The numerous *radical leaves* are two inches long, tapering at the base, bluntish, with coarse blunt unequal teeth, green, not hoary; shaggy with simple bristly hairs about the margin and mid-rib on both sides. The dilated, obtuse, smooth scales of the *calyx* are more regularly and copiously imbricated than usual in this genus, and are prettily variegated with white marginal cottony down. The *seed-down* is feathery, but of the *seeds* or *receptacle* we can see nothing.

21. *A. hieracioides*. Corymbose Hawk-bit. Willd. n. 17.—"Stem branched at the top, hairy. *Leaves* oblong-lanceolate, hairy, toothed. *Hairs* forked."—Native of Galatia. Willdenow, who had a dried specimen, describes this plant as resembling *Hieracium murorum*. The *stem* is erect. *Leaves* sessile, an inch and a half long. *Flower-stalks* scaly and hairy. *Down* sessile, feathery. *Receptacle* naked.

THRINIUM-GILD. See TRINIUM-Gild.

THRIO,  $\Theta\rho\iota\alpha$ , in *Antiquity*, a festival in honour of Apollo.

THRIPS, in *Natural History*, a name used among the ancients to express a sort of worm hatched from the egg of a beetle: which, while in the worm-state, eats its way into wood, and forms cells and cavities in it of various shapes, and in various directions, often resembling the figures of letters or other things. See ENXYLON.

The ancient Greeks are said to have used small pieces of the wood thus eroded in particular forms, as seals, before the engraving of these utensils was invented; and indeed they must very well have served this purpose, since it is scarcely possibly to conceive how one of these pieces of corroded wood should be counterfeited, or the impression imitated.

Lucian mentions his marking his olives with a signature of one of these pieces of wood greatly eroded, and uses the word *thrips*, not as the name of the animal, but of the piece of wood eroded by it. Theophrastus, Pliny, and Aristotle, also use the same expression; and we find that the word thrips was as frequently used to signify the pieces of wood eroded, as the animal which eroded them.

THRIPS, in the *Linnean System of Zoology*, is a genus of the order of Hemiptera, the characters of which are, that the rostrum is obsolete, being hidden within the mouth; the antennæ filiform, and as long as the thorax; the body slender, and of equal thickness; the abdomen reflexible, and often bent upwards; the four wings extended, incumbent, narrow,

## THRIPS.

row, and crossing one another at some distance from their base. The thrips has six feet, and the tarsus of each foot has only two articulations. Gmelin enumerates the following eleven

### Species.

**PARADOXA.** Brown, with abbreviated wings, and antennæ pectinate, fissile and filiform. Found in China, but Gmelin doubts whether it be of this genus.

**PHYSAPUS.** With glaucous elytra or shell-wings, and black body. Found frequently on flowers in Europe.

**MINUTISSIMA.** With glaucous elytra and body, and brown eyes. Found as the former.

**JUNIPERINA.** With snowy elytra and brown body. Found in the galls of the juniper.

**ULMI.** Black, with snowy ciliated wings, and acuminated anus. Found gregarious on the bark of the elm.

**URTICÆ.** Yellow, with whitish elytra. Found solitary on the leaves of the nettle, vine, and hazle.

**FASCIATA.** With elytra banded with white and black, and brown body. Found on flowers in Europe.

**FUSCA.** Blackish, with glaucous elytra. Found in Denmark: the female probably fasciated?

**OBSCURA.** Yellowish, with palish elytra, and eyes and wings of the abdomen black. Found in Denmark.

**RUFÆ.** Red. Found on the spikes of wheat; if it be not the larva of the minutissima.

**VARIEGATA.** Variegated. Found on flax.

The thrips is highly injurious and destructive to many sorts of fine fruited trees, but particularly so to those of the grape or vine kind. The best and most effectual means of preventing its mischievous effects, in such cases, is probably that of frequent good washing of the trees with common water, by the engine or otherwise. It has lately been advised that this should be done every evening, as, when performed in the heat of the sun, the vines are materially injured. Indeed all such trees should, it is supposed, be well washed every evening, until the berries begin to colour, whether infested with insects or not, but especially in the former state; after which it is to be wholly discontinued.

Where there is a neglect of washing the trees in this or some other way, the thrips, for the most part, makes its appearance. In such cases, these insects may without much difficulty be destroyed by the fumigation of tobacco and damp hay; the plants or trees being well washed after it by pure water.

The *white-bug* is another insect which is often very hurtful to peach-trees and vines in forcing-houses; and the cause of which is believed to be much owing to the trees not being daily properly washed in the above manner. Each of these sorts of trees stand in need of particular management in clearing them of this insect.

The *brown-bug* too occasionally makes its appearance on, and is hurtful to peach-trees in such situations, especially when they are shaded, or approach near the flues of the houses. Proper washing of the trees, in these cases, with lime-water, in the winter season; and syringing them with it as soon as the leaves have fallen off, are often very effectual in removing such insects.

The *green-fly* is also very destructive to peach-trees, especially when in the forcing state. These are the most effectually destroyed by means of well washing the trees daily in a regular manner, after the work of forcing is begun. It is the common practice of most gardeners to discontinue such washings as soon as the flowers begin to make their appearance, but others have lately continued them with supposed

advantage, and not found them to prevent the fruit from setting. If any flies of this sort present themselves, they may be kept under by proper watering or washing, as above, and by carefully picking off the first buds on which they appear, which is found to prevent them from breeding, and to render the use of tobacco-smoke unnecessary. Fumigations of this substance are, however, sometimes beneficial in these cases in removing the vermin.

This and the *blue-fly* too are often very injurious to plum-trees, especially after they have been affected with the honey-dew. The manner of getting rid of them in such cases, which has lately been recommended, is that of watering the trees in a plentiful manner two or three times a week, if the weather be dry; and during the continuance of the above sort of dew upon the trees, preparing the water with a little common salt and the fluid part of a good portion of broom that has been boiled. This mixture, it is said, effectually kills the flies, while it does no injury to the trees, if care has been taken not to use too large a proportion of salt. This practice also tends to make the trees shoot stronger, and to hinder such insects from breeding.

There is another insect which has lately been found to be greatly injurious to apple and other fruit trees, but which is yet only little known to gardeners. It is the *Tortrix wæberana*, which may be seen well described in the second volume of the "Transactions of the Horticultural Society of London." It is there stated to be occasionally very hurtful to such trees, not only in the larva state, but others; and that its attacks are by no means confined to the diseased parts of such trees. The insect in its perfect state is a small moth, which is very abundant in gardens and fruit grounds.

In what regards the means of removing and destroying such insects when their attacks become injurious, the hints given below are thrown out. The first and most essential process evidently is, it is thought, to cut away the edges of the cankered parts where they are chiefly found, making the wound smooth, and covering it with any composition likely to prevent the moth from depositing her *ova* or eggs there again. One precaution is necessary, which is to put into boiling water, or to bury at a considerable depth, the cut-out pieces of decayed bark containing the larvæ; which, if left near the tree, would soon crawl from their holes or other places, and remount it; thus defeating the labour of the horticulturalist, who often, from neglecting a slight additional trouble, loses the benefit of more painful exertions. Where the larvæ are found to have insinuated themselves generally into the rough bark of old trees, it would probably, it is thought, be advisable to scrape off the whole of the lifeless bark, and such portions of the alburnum as are injured, as suggested by Mr. Knight on another occasion; a process which, there can be no doubt, it is said, would be advantageous to the tree in other respects, as pointed out by the above writer. And where projecting saw-dust-like masses shew that the larva has attacked even smooth-barked trees, the insertion of a blunt prickler into the hole would probably, in most cases, suffice to destroy it, and do less injury to the tree than suffering it to attain its growth. But the mode which is most to be recommended in this, as in the case of almost all insects hurtful to fruit or other trees, is, it is said, to destroy the moths themselves by collecting them from off the trees, or other places, during the summer months, which might be done by children properly directed and provided with suitable means for the purpose, or in other ways. The destruction of every female moth, before the deposition of its eggs, may, it is said, be fairly calculated to prevent the

existence of some hundreds of larvæ; and thus, in any garden or fruit-ground not in the neighbourhood of others, where the same methods are neglected, the whole race might, it is supposed, be extirpated in a few years.

**THRISSA**, in *Ichthyology*, the name given by the Greeks and by the modern Latin writers to the fish which we call the shad, or the mother of the herrings.

**THRIVING**, in *Neat Cattle*, a term made use of by graziers and other stock-farmers to signify the property they have of doing well on the food they consume, or of fattening kindly, in contradistinction to that of a stunted unthrifty growth, or bad sort of feeding. It is mostly known by the hides or coats of the beasts having a mellowness of feel in handling them, with a fineness and sleekness in their appearance. This depends, in a very great degree, upon the pile and growth of the coats, for the shorter and sleeker they are, the more thriving the beasts; as, on the contrary, in proportion to length and hardness, is the unthriftness of the stock.

A coarse, rough, thick hide is an indication too of hardness of flesh in beasts; while, on the contrary, fineness and closeness of grain in it, give the feel of fine texture in the hide.

These circumstances demand great attention in choosing neat cattle for all purposes.

**THRIVING Drinks**, such drinks as are prepared and given to neat cattle, or other beasts, when in a low unthrifty state. They are mostly composed of the powders of different sorts of aromatic seeds, such as those of aniseeds, carraway seeds, and grains of paradise, in the proportion of about two ounces of each: which are mixed well together and put into a quart of warm ale, in which they are given to the beasts; or of sweet fennel seeds and cummin seeds, each two ounces, long pepper, ginger, turmeric, and elecampane, each one ounce, mixed together, to be given in the same way as above, to which sometimes a little fresh butter and treacle or coarse sugar are added. Snake-root and gentian root, in powder, too, are sometimes employed in such drinks.

As the principal effect of such drinks, for the most part, depends upon the essential oil the substances may contain, they will be somewhat preserved and increased by giving them in the above manner.

The most proper management for the beasts in these cases, is to change their food as much as possible for the better, letting them have occasional good mashes of scalded bran, ground malt, or other such substances, with a small proportion of ground oats or barley meal put into them: warm water may also sometimes be necessary.

By the use of drinks of this sort, very reduced cows and other neat cattle may often be readily restored and brought into a thriving condition.

**TRIXSPERMUM**, in *Botany*, so called by Loureiro, from τριζ, a hair, and σπέρμα, seed. We cannot say much for the construction of this word, which should have been *Trichospermum*, provided there be no dormant claim to that name; but it is not worth changing, till we are better assured of the genus.—Loureir. Cochinch. 519.—Class and order, *Monandria Monogynia*. Nat. Ord. *Orchideæ*?

Gen. Ch. *Common Calyx* catkin-like, linear, compressed, fleshy, with alternate, acute, single-flowered scales. Perianth none. *Cor.* Petals five, linear-awlshaped, long, erect, nearly equal. Nectary attached to the receptacle, between the two lowermost petals, deeply divided into two lips; the inner one three-cleft, embraced by the petals, its lateral segments short and blunt, the middle segment longest, conical, ascending; outer one ovate, undivided, prominent

beyond the petals. *Stam.* Filament solitary, thread-shaped, short, attached to the pistil; anther ovate, of two cells, with a lid. *Pist.* Germen thread-shaped, straight, bearing the flower; style thick, unequal, standing on the base of the nectary; stigma simple. *Peric.* Capsule oblong, triangular, the angles acutely emarginate, of three valves and one cell. *Seeds* numerous, long, very slender, like hairs.

Eff. Ch. Petals five, linear, erect. Outer lip of the nectary ovate, prominent.

1. *Th. centipeda*. Nhánh gỏi rít of the Cochinchinese. Found in Cochinchina, creeping upon the native trees. The *stem* is parasitical, long, compressed, perennial, creeping by means of simple, very short, lateral roots. *Leaves* linear-lanceolate, entire, small, sheathing, reflexed. *Flowers* pale yellow, with a reddish nectary, in straight, lateral, catkin-like, two-ranked spikes.

We guess this to be allied to some of those parasitical *Orchideæ*, formerly referred to *Epidendrum* by Linnæus; and by Swartz chiefly to *Cymbidium*. The structure of the whole tribe is so obscure, that Loureiro may very well be excused if we cannot entirely unravel his description.

**THROANA**, in *Ancient Geography*, a town of India, on the other side of the Ganges, which Ptolemy assigns to the people called Lesti, or pirates.—Also, a town of Serica, near the mountains in the vicinity of Asmiræa. Ptolemy.

**THROAT**, the anterior part of an animal, between the head and the shoulders, in which is the gullet.

Physicians include, under the word throat, all that hollow, or cavity, which may be seen when the mouth is wide open.

It is sometimes also called *isthmus*, because it is narrow, and bears some resemblance to what is called by geographers *isthmus*.

**THROAT, Sore**, in *Medicine*. See QUINZY.

**THROAT, Wounds of**, in *Surgery*. See WOUNDS.

**THROAT**, in *Architecture, Fortification, &c.* See GORGE and GULA.

**THROAT**, in *Ship-Building*, the inside of knee-timber at the middle or turn of the arms. Also, the middle part of the floor-timbers; the inner part of the arms of an anchor, where they join the shank; and the inner ends of booms and gaffs, where they traverse round the mast.

The throat is opposed to peek, which implies the outer extremity of the said gaff, or that part which extends the full behind. Hence the ropes employed to hoist up and lower a gaff, being applied to those parts of it, are called the throat and peek haliards. Falconer.

**THROAT-Weed**, in *Botany*, the name of a perennial weed common in pasture grounds. The stalk is cornered and undivided. The flowers grow in bunches at the top of the stalk. They are erect, of a beautiful purple colour, and divided in the middle into five acute segments. It is a very pernicious weed when suffered to get a-head in such lands, and not capable of being destroyed without considerable difficulty and trouble. See TRACHELIUM.

This plant yields, when wounded, a milky juice in great plenty, and this, if received into a shell or other small vessel, curdles immediately, and the whey runs from the thick part: this whey is of a brown colour, whereas that of the wild lettuce is of a fine purple, and dries into a cake that may be crumbled into a purple powder. The juice of the throat-weed smells sour, and its curdled part, being dried, burns like resin at the flame of a candle. Phil. Transf. N<sup>o</sup> 224.

**THROATING**, in *Agriculture*, the act of mowing beans against their bending, which is never done but in a thin crop. But in such it is often necessary, in order to cut them with the most perfection and advantage. They should

should never be allowed to become too ripe when intended to be cut in this manner. The term is also occasionally applied to some other purposes in husbandry.

**THROGGY**, in *Geography*, a river of Monmouthshire, which runs into the Severn, 4 miles S.W. of Chepstow.

**THROMBUS**, from *θρομβος*, *coagulated blood*, a clot of blood. The term has also been applied to a tumour, formed of a collection of extravasated blood under the integuments after bleeding. When such an extravasation, though of some extent, is not considerable, it is usually called an *ecchymosis*; which see.

A thrombus sometimes depends on the surgeon having totally divided the vein; but much more frequently on his not having made the opening in the vessel properly correspond to that in the skin. The patient's altering the posture of his arm, while the blood is flowing into the basin, will often cause an interruption to the escape of the fluid from the external orifice of the puncture; and, consequently, it insinuates itself into the cellular substance in the vicinity of the opening in the vein. In proportion as the blood issues from the vessel, it becomes effused between the skin and fascia in the interstices of the cellular substance, and this, with more or less rapidity, and in a greater or lesser quantity, according as the edges of the skin impede more or less the outward escape of the fluid. Sometimes, also, a thrombus forms after venesection, when the usual dressings, compresses, and bandage, have been put over the puncture, and the patient imprudently makes use of the arm on which the operation has been done. This is more particularly liable to happen when a very large opening has been made in the vein.

The accident is not attended with any danger when the extravasation is inconsiderable; for, in this circumstance, the tumour generally admits of being easily resolved by applying to it linen dipped in any discutient lotion. If the swelling should be more extensive, applying to it a compress wet with a solution of common sea-salt, is deemed a very efficacious plan of promoting the absorption of the extravasated blood. Brandy, and a solution of the muriate of ammonia in vinegar, are likewise eligible applications.

It sometimes happens, that a thrombus induces inflammation and suppuration of the edges of the puncture. The treatment is now like that of any little abscess: a common linseed poultice may be applied, and any considerable accumulation of matter should be prevented, by making an opening with a lancet in proper time. As soon as the inflammatory symptoms have ceased, discutients should be resorted to again, for the purpose of dispersing the remaining clots of blood and surrounding induration. Cooper's Dict. of Practical Surgery.

**THRONE**, *θρονος*, a royal seat, or chair of state, enriched with ornaments of architecture and sculpture, made of some precious matter, raised one or more steps, and covered with a kind of canopy.

Such are the thrones in the rooms of audience of kings, and other sovereigns.

**THRONI**, in *Ancient Geography*, a town of the isle of Cyprus, upon the southern coast, S.W. of Leucolla, and at some distance N.W. of the promontory of Pedalium. Near this town was a promontory of the same name, according to Ptolemy.

**THRONION**, or **THRONIUM**, a town belonging to the Locrians, situated, according to Strabo, 20 stadia from the sea.

**THRONIUM**, a town of the Abantide, which was a district of Thesprotia, in Epirus, towards the Ceraunian mountains. On the return from the war of Troy, when the ships of the Greeks were dispersed, the Locrians of

Thronium, and the Abantes of Eubœa, were driven with eight vessels towards the Ceraunian mountains. They established themselves in this place, and built a town, which they called Thronium, and they gave the country the name of the Abantide. They were afterwards expelled by the Apollonians.

**THROO**, or **THROUGH**, in *Agriculture, a term signifying a breadth, slip, or width of corn, which a set of reapers, &c. drive before them at once, whether it consist of one or more lands or ridges. The mode of reaping by means of throos is very common in some of the northern counties of the kingdom, and supposed by some to greatly expedite the work.*

**THROPPLE**, among country people, denotes the wind-pipe of a horse.

**THROSTLE**, or *Song-Thrush*, *Mavis*, or *Turdus musicus* of Linnæus, in *Ornithology*, is called by authors the *turdus viscivorus minor*, to distinguish it from the larger species, called in English the *missel-bird*, and usually known among us by the simple name of *thrush*. It is called *viscivorus* by authors, from its resemblance in colour to the other *viscivorus*, not from its feeding on the mistletoe-berries, as that does.

It resembles the missel-thrush in colour, except that the inner coverts of the wings are yellow.

It feeds on worms, snails, and small insects, and remains with us the whole year. It builds with moss and stubble, and lines the nest with mud. On this it lays five or six eggs, which are of a blueish-green, variegated with a few black spots. It sits on hedges and bushes, and sings very agreeably.

The throistle is the finest of our singing-birds, not only for the sweetness and variety of its notes, but for the long continuance of its harmony; as it obliges us with its song for nearly three parts of the year. See **TURDUS**.

**THROSTLING**, a disease of black cattle, proceeding from humours gathering under their throats; by which means their throats are so dangerously swelled, that they will be choked, unless seasonably relieved by bleeding.

**THROUGH-STONE**, in *Rural Economy*, a term which signifies a long stone which passes the whole breadth of the wall in making fences of that kind, and which binds them together in a more perfect manner than would otherwise have been the case. It is always of great importance to have plenty of throughs in fences of this nature, from almost the bottom part to near the top.

**THROW**, the provincial name of a turner's lathe. There is a great variety of these sorts of tools in use for different purposes. See **LATHE**.

**THROW the Glove**. See **GLOVE**.

**THROWED SILK**. See **SILK**.

**THROWSTER**, one who prepares raw silk for the weaver, by cleansing and twisting it. See **MILLING** and **SILK**.

**THRUM**, in *Gardening*, among the cultivators of fine flowers, is a term applied to the thread-like internal bushy parts of them, and which, in some sorts of good flowers, such, for instance, as the auricula and other similar kinds, should be of a bright colour, and the chives, or thready bristles, of which it is composed, clear and shining with spangles, somewhat like gold-dust; and they should also be distinct from each other, leaning inwardly towards the pipe; as when they appear clotted together, or look battered or mis-shapen, the beauty of the flowers to which they belong is much impaired; which is not unfrequently occasioned by the wild and other bees, which, when in search of honey or food, are apt to greatly hurt such parts of fine flowers.

flowers. The bees, in such cases, should be carefully taken by proper means, and be prevented as much as possible from collecting their food from such fine kinds of flowers.

**THRUM-Cap Island**, in *Geography*, a low woody island, of a circular form, and not much more than a mile in compass, in the South Pacific ocean, covered with verdure of many hues, but without inhabitants, discovered and so called by Cook in April 1769. S. lat.  $18^{\circ} 35'$ . W. long.  $139^{\circ} 48'$ .

**THRUM-Wort**, in *Agriculture*, a troublesome weed in some lands of the rather moist down kind, which is of the perennial sort.

**THRUMMING**, in *Rigging*, denotes interplacing short pieces of thrums, or rope-yarn, in a regular manner into matting, through intervals made by a fid, or large needle.

**THRUSH**, an affection of the inflammatory and suppurating kind in the feet of the horse, and some other animals. In the horse it is an inflammation taking place in that part of the foot termed the sensible frog, which is mostly occasioned from want of due cleanliness in it, especially in those of the team or working sort, from the heels being in a contracted state, or from shoeing upon erroneous and bad principles, but most commonly from the last of these causes. See **SHOEING**.

The disease may be known to be present in this, as well as in other animals, by a tenderness and uneasy feel being shewn on pressing the frog, or affected part, and its being accompanied with a discharge of matter of the purulent kind, as well as by other similar appearances.

The means of removing the complaint in the horse, when inflammation is chiefly present, consist first in taking away the shoe, and lowering the heels, in such a manner as that the frog or diseased part may come in contact with the ground or floor: after which the animal may be suffered to stand some days without shoes, the part being well washed two or three times a day with a common stable brush, and a solution of soft soap in rain-water, an application composed of white vitriol, Armenian bole, and alum, in fine powder, of each half an ounce, mixed up with common tar, in a sufficient proportion to make a sort of ointment, being then had recourse to as a dressing. This may be used spread upon lint, being applied between the cleft of the frog, or affected part, and renewed as often as there may be a necessity.

It is likewise advised by some, that all the diseased parts, in such cases, should be carefully removed by means of a drawing-knife, and that if the animal be not allowed to have rest, a bar-shoe must be had recourse to, until the disease becomes quite removed. It is thought, too, that three or four pints of blood may often be taken away with advantage in cases where there is much inflammation, and mashes with nitre be given in the evenings. Much benefit also may sometimes be found from the use of diuretic balls, and from the foot affected being fomented with warm water, in which a handful of common salt has been dissolved, just before the application of the above dressing. Great utility is occasionally derived, too, from the insertion of a seton or rowel in the chest, or other proper part, and letting it continue some time. See **SHOE**.

In cases where the complaint proceeds chiefly from contracted heels, some suppose the only certain and effectual mode of removing the affection is, perhaps, that of the use of the artificial, or patent frog, not long ago invented by Mr. Coleman, who has bestowed much attention on the feet of animals, especially of the horse. See **FROG**.

In other animals, where the hoofs, claws, or other parts of the feet are affected with inflammation, and collections

or discharges of matter, in some measure of the thrush kind, or having some resemblance to it, the best means of relief are probably those of first trying the effects of discutient saturnine applications, and if these do not succeed, to have recourse to warm emollient fomentations or poultices, then cutting or paring the parts down so as to lay them well open, and let out any thing they may contain, dressing the openings with mild escharotics, as there may be occasion. In this way, very troublesome affections of this sort may often be speedily removed.

**THRUSH**, in *Medicine*. See **APHITHÆ** and **INFANT**.

**THRUSH**, in *Ornithology*, is the *turdus viscivorus* of Linnæus, and the largest of the genus. See **TURDUS** and **MISSEL-BIRD**.

**THRUSH**, *Wind*. See **RED-WING**.

**THRUSHEL**, in *Geography*, a river of England, in the county of Devon, which runs into the Tamer, opposite to Launceston.

**THRUSK**. See **THIRSK**.

**THRUST**, in *Fencing*, is an action of which there are three kinds. *To thrust in carte*, is to throw your hand as far as possible on the inside, with the point of your sword towards your adversary's breast: *to thrust seconde*, is to have your arm in a perfect opposition to your adversary's, holding your head inside: *to thrust tierce*, differs from carte only by the position of the hand, which must be reversed.

**THRUSTING**, or *Hand-pressing*, in *Dairying*, is a term applied to the practice of squeezing and forcing the liquid parts contained in the curd out of it by the hand, or other such means, after it has been properly reduced, and placed by a cloth in an upheaped or conical manner in the vat or hoop.

**THRUSTING-Screw**, in *Rural Economy*, a contrivance of the large screw kind, calculated for affording due pressure in the making of cheese with facility and convenience. These screws are perfectly simple, and capable of being made either of wood or iron; but the latter material is probably by much the best. They may be wrought in several different ways, but it is commonly done by means of a sort of lever applied in some manner or other, not unfrequently through a hole for the purpose in the head of the large screw. In some districts they have them fixed up to the under-sides of the floors above the pressing-rooms, and the power of them so managed as to be regulated at pleasure. By means of these thrusting-screws, it is evident that the pressure can be gradually increased, as there may be occasion, from the first application to the concluding hard or heavy pressure in finishing the work. This command of power is, of course, a circumstance of great utility and advantage in such business.

**THRUSTINGS**, a term applied in cheese-making, in some districts, to the *white whey*, or that which is the last pressed or forced out of the curd by the hand and other means, after it has been put into the cheese vat. In some instances in the process and practice of making butter of the whey kind, these thrustings are set by in earthen pans for the purpose, in order to acidulate, or *carve*, as it is called in some places, either by means of the warmth of the season, or of a room, for being churned, in the same way as in the common manner practised, in many places, for making butter from milk. See **WHEY**.

These thrustings, probably, form and constitute the best butter of the whey sort, though it is made from that fluid managed in other ways, as seen under the head just referred to above.

**THRYALLIS**, in *Botany*, an ancient Greek name for something of the Mullein kind, whose woolly leaves served

to make wicks for lamps. It is not easy to conceive how Linnæus came to apply this name here, nor can we trace out any thing to account for his having done so. We most readily agree with De Theis, that the shrub about to be described has nothing in common with *Verbascum* but its yellow flowers. (See Dioscorides, book 4. chap. 104.)—Linn. Gen. 213. Schreb. 289. Willd. Sp. Pl. v. 2. 570. Mart. Mill. Dict. v. 4. Juss. 251.—Class and order, *Decandria Monogynia*. Nat. Ord. *Tricocce*, Linn., *Acera*, Juss.

Gen. Ch. *Cal.* Perianth inferior, in five deep, lanceolate, erect, permanent segments. *Cor.* Petals five, roundish, spreading. *Stam.* Filaments ten, awl-shaped, longer than the calyx; anthers roundish. *Pist.* Germen obtuse; style thread-shaped, the length of the stamens; stigma simple. *Peric.* Capsule with three sides, and three angles, obtuse, separable into three parts; its cells bursting at the external angle. *Seeds* solitary, very smooth, obovate; obtuse at the base, with an incurved point.

1. *Th. brasiliensis*. Brazilian Thryallis. Linn. Sp. Pl. 554. Willd. n. 1. (*Fruticescens herba*; Marcgr. Bras. 79. f. 3.)—Native of Brasil. A little shrub, with round, jointed, reddish branches. *Leaves* on reddish footstalks, opposite, ovate, entire, about an inch long; pale green above; whitish beneath, with a slender mid-rib. *Stipulas* bristle-shaped. *Clusters* terminal, solitary, from six or seven inches to a foot long, with very slender partial stalks, longer than the flowers, and very short setaceous bractæ. *Flowers* small, elegant, yellow, bordered with red, with which colour also their yellow stamens are speckled. *Fruit* three-lobed. Neither the plant nor its flower has any remarkable odour.—Linnæus appears to have examined a dry specimen of this plant, but it is wanting in his herbarium, as well as in every other that we have seen. His idea of its natural order is surely less correct than Jussieu's. Specimens without fruit are not unlikely to have been overlooked for some nondescript *Banisteria* or *Malpighia*.

THRYANDA, in *Ancient Geography*, a town of Asia Minor, in Lycia. Steph. Byz.

THRYOCEPHALUM, in *Botany*, a genus of Forster's, named from *θρυον*, a sort of rush, and *κεφαλη*, a head, because of the habit of the plant, and its little round head of flowers. This genus is the same as KYLLINGIA. (See that article.) The only species mentioned by Forster, is there considered by us as *K. monocephala*. Vahl, in his *Enum. Plant.* v. 2. 381, refers it to *K. triceps*, probably because he saw a specimen with a compound head. This very circumstance strengthens his own suspicion, that these two supposed species of *Kyllingia* are not, in reality, distinct. Our specimen from Forster himself has a very slight indication of a small lateral head, by the side of the principal one, nor can it be otherwise distinguished from *K. monocephala*. In the structure or appearance of any other part, we cannot discern the least difference between *monocephala* and *triceps*, in separating which we considered more in those who have originally described these plants, than it seems they deserved.

THRYOESSA, or THRYON, in *Ancient Geography*, called from the time of Strabo Epitalium, situated on the left banks of the Alpheus, E. of Olympia.

THUAREA, in *Botany*, bears that name in honour of M. Aubert du Petit Thuars, a French botanist of the present day, who is cited for the genus itself in Perf. Syn. v. 1. 110.—Brown Prodr. Nov. Holl. v. 1. 197.—Class and order, *Triandria Digynia*. Nat. Ord. *Gramina*.

Ess. Ch. Calyx-glumes of one valve, two-flowered, spiked, unilateral, on a dilated common stalk; the lowermost ones only partly perfect; the rest male only; the inner floret of

the lowermost glume male, its outer valve resembling the calyx. Nectary of two scales at the base of the germen. Stigmas feathery. Seed wrapped in the corolla, and enclosed in the hardened, closed, involute stalk.

The stems are creeping, very long, with erect, short, undivided, leafy branches. Spike solitary, terminal, short, for a long time half enclosed in a leaf-like sheath. The common stalk is thick and coriaceous, not membranous, as M. du Petit Thuars terms it, he having, as Mr. Brown supposes, confounded that part with the sheath. Flowers sessile, in a simple row, one or two of the lowest only being perfect, the remaining four, five, or six, in the contracted portion of the spike, males.

Mr. Brown observes, that this genus of grasses is not very distantly related to PANICUM (see that article); especially to *P. dimidiatum*, Retz. Obs. fasc. 6. 23; but in *Thuarea*, the calyx-glumes are, with respect to the stalk, inverted, and want an outer valve. In structure this genus agrees, in many particulars, with SPINIFEX, (see that article,) in which the sexes are indeed more separated, and therefore a requisite abundance of males is provided. The figure and economy of the common-stalk, or rachis, too is different; though that part is permanent in both genera, and assists in both, though not in the same manner, to disseminate the seeds.

The only species of which we can give an account are the three following, though Mr. Brown mentions also a *T. farmentosa*.

*T. latifolia*. Br. n. 1.—“Perfect flowers two. Stems downy. Leaves lanceolate, silky on both sides.”—Gathered by sir Joseph Banks, in the tropical part of New Holland.

*T. media*. Br. n. 2.—“Perfect flowers solitary. Leaves linear-lanceolate; their under side smooth, as well as the stem.”—Found by Mr. Brown, in the tropical part of New Holland.

*T. involuta*. (*Ischæmum involutum*; Forst. Prodr. 73. Willd. Sp. Pl. v. 4. 741.)—Perfect flowers solitary. Leaves lanceolate, nearly smooth on both sides.—Gathered by Forster in the Society Isles, and some other places within the tropics. The specimen given by him to the younger Linnæus is marked *Tabaité*. The erect stems, or branches, are but two or three inches high, simple, striated, smooth, each bearing at the bottom one lanceolate, acute, striated leaf, about its own length; sheathing at the base; becoming involute in drying. Sometimes there is another leaf, about half as long, with a sheath almost an inch in length, near the middle of the branch. Spike scarcely an inch long, terminal, of about four flowers, springing laterally from the hollow of a concave pointed leaf, rather shorter than the rest. Calyx ribbed. Corolla smooth. Feathery stigmas very conspicuous in the lowermost flower.

THUBUNA, TUBNAB, in *Ancient Geography*, a town of Mauritania Sitifensis, according to Ptolemy; situated in the mountains, between two rivers, S.W. of Igilgili.

THUBURSICA, a town of Africa, in New Numidia. Ptol.

THUBUTIS, a town of Africa Propria, near Bullaria. Ptol.

THUCCA, or TUCCA, *Dugga*, a town of the interior of Africa, mentioned by Ptolemy; situated at the extremity of a small chain of hills about two miles S. of Tiburcum-bure. On this site were found many mausoleums, and the portico of a temple ornamented with beautiful columns. Here was also an aqueduct.

THUCYDIDES, in *Biography*, a celebrated Greek historian, was born in the 77th Olympiad, about 470 B.C. The

The name of his father was Olorus, or Orolus, that of a Thracian prince, indicating a connection with Thrace, in which he seems to have possessed gold-mines, and to have had influence over its chiefs. He belonged to one of the principal families at Athens, and was related to that of Miltiades. His education was that which distinguished Athenians of rank: Antiphon being his preceptor in rhetoric, and Anaxagoras in philosophy. When he heard Herodotus recite his history at the Olympic festival, he is said to have shed tears; and Herodotus observing it, congratulated Olorus on his son's disposition. At the commencement of the Peloponnesian war he was at Athens, and shared in the calamity of pestilence that then occurred; and in the eighth year of that war he had a command in Thrace, and was opposed to the Spartan general Brasidas, who surprised the town of Amphipolis, for the loss of which Thucydides was punished by banishment, though it does not appear that he could have prevented it. During the twenty years of his exile, he devoted himself to literary researches and observations through different parts of Greece, and thus collected materials for the history which he was projecting. He resided for a considerable time in Thrace, but the place and time of his death are not ascertained. Dodwell conjectures that he passed his 80th year, and died in Thrace. His history comprehends the transactions of the first twenty years of the Peloponnesian war, disposed in eight books; more limited in its compass than that of Herodotus, but not merely rivalling but surpassing it in historical merit, more especially if we admit what a modern writer says of it, "that the first page of Thucydides is the commencement of real history." The distinguishing characteristics of this historian are diligence of research, and the selection of the best authorities, and perfect impartiality. To these qualities we may add sagacity in investigating causes and effects, and a philosophical spirit in forming a discriminating judgment of human affairs. His narration is occasionally very interesting, and indicates the writer of genius. His style, which has undergone much criticism, is of that kind which the ancients termed the austere, aiming at force and brevity rather than harmony, elegance, or perspicuity. Its conciseness and frequent transpositions render it frequently obscure, nor is this defect compensated by its energy and elevation. The most valued editions of this work are Hudson's, Oxon. 1696; Wasse and Ducker's, Amst. fol. 1731; and the Leipzig, 2 vols. 4to. 1790—1804. Voff. Hist. Græc. Gen. Biog.

THUDACA, in *Ancient Geography*, a town of Africa, in Mauritania Cæsariana, near Tingis. Ptol.

THUELATH, a maritime town of Africa, on the coast of Libya, between Autolatæ and Thagana. Ptol.

THUEYE, in *Geography*, a town of France, in the department of the Ardeche; 18 miles W. of Privas.

THUJA, in *Botany*, *θύια*, *θύια*, or *θύια* of the Greeks, the name of a tree, whose very durable wood served, according to Theophrastus, to make images. Its root in particular, being curiously twisted or veined, was used for the most valuable ornamental works. This plant was probably the *Juniperus Oxycedrus*, very common throughout Greece and the Archipelago, of which Mr. Hawkins is of opinion that the most ancient statues were made. It is the Small Cedar, κεδρός μικρὰ of Dioscorides, and still universally bears the name of κεδρός in modern Greek. Our present genus of *Thuja* has nothing in common with this classical plant, except being an aromatic evergreen tree, of the same natural order, with a very durable wood; but it is not a native of Greece or the Levant.—Linn. Gen. 500. Schreb. 651. Willd. Sp. Pl. v. 4. 508. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 321. Pursh 646. Juss. 413. Tourn. t. 358. Linnæus

Illustr. t. 787. Gært. t. 91.—Class and order, *Monoclea Monadelphica*. Nat. Ord. *Coniferae*, Linn. Juss.

Gen. Ch. Male, *Cal.* Catkin ovate, composed of a common stalk, on which the flowers stand opposite, in three rows, each flower having for its base a nearly ovate, concave, obtuse scale. *Cor.* none. *Stam.* Filaments in each flower four, but scarcely visible; anthers as many, attached to the base of the scale above mentioned.

Female on the same plant, *Cal.* Catkin nearly ovate, with opposite flowers, and consisting of two-flowered, ovate, convex scales, converging longitudinally. *Cor.* none. *Pist.* Germen minute; style awl-shaped; stigma simple. *Peric.* Cone ovate-oblong, obtuse, bursting lengthwise, into oblong imbricated, nearly equal, obtuse, externally convex scales. *Seeds* solitary, oblong, each surrounded by a longitudinal membranous emarginate wing.

Eff. Ch. Male, Catkin with imbricated scales. Corolla none. Anthers four.

Female, Catkin becoming an imbricated cone, with two-flowered scales. Corolla none. Seed surrounded by a vertical membranous wing.

Obs. Linnæus indicates the close relationship of this genus to *Cupressus*. They are nevertheless distinguished by the peltate scales of the cone in the latter, and its angular, obtuse, scarcely winged, *seeds*, or *nuts*.

1. *Th. occidentalis*. American Arbor-vitæ. Linn. Sp. Pl. 1421. Willd. n. 1. Ait. n. 1. Pursh n. 1. "Michaux Arb. For. v. 3. 29. t. 3." (Arbor vitæ; Clus. Hist. v. 1. 36. Ger. Em. 1369.)—Young branches two-edged. Leaves imbricated in four rows, compressed, ovate, somewhat rhomboid, dotted. Inner scales of the cone abrupt, tumid under the point.—Native of North America, from Canada to the mountains of Virginia and Carolina, blossoming in May. It is rather scarce in the southern states, and only found on the steep banks of mountain torrents. The branches are extremely tough. *Pursh*. This tree was introduced into our gardens in Gerarde's time, or before, and is much esteemed for ornament and shelter in shrubberies, or for platted and clipped hedges in nursery-gardens, in which last state it is really very beautiful. By a strange mistake of Linnæus, this species is handed down as a native of Siberia; because Gmelin, *Fl. Sib.* v. 1. 182, mentions a *Thuja*, to which he misapplies the synonyms of the present, but which by his own account is different; for he says it is "paler than the garden kind, and smaller in all its parts." It was brought him by a travelling surgeon, from rocks near Pekin in China, and could be no other than the *Th. orientalis*, hereafter described. *Th. occidentalis* is a perfectly evergreen tree, of humble growth, much branched, very different from most others in the compressed vertical aspect of its younger shoots, and their closely imbricated leaves, which are small, obtuse with a point, smooth; those of two opposite rows compressed and keeled; the intermediate ones flat, with a glandular point, or cell of resin, at the back. The flowers appear in May, and are small, solitary, terminal; the males yellowish, and most abundant. Cones ripened the following year, drooping, each the size of a silberd-kernel, consisting of about half a dozen lax, smooth, coriaceous scales. The smell of the bruised plant is something like Savine, aromatic, but not agreeable. The wood is not hard, but tough and extremely durable, on which last account it is much esteemed in America for making pales and fences.

2. *Th. orientalis*. Chinese Arbor-vitæ. Linn. Sp. Pl. 1422. Willd. n. 2. Ait. n. 2. Gært. f. 1. "Schkuler Handb. v. 3. 285. t. 309. (Thuya; Gmel. Sib. v. 1. 182 Th. n. 3; Duhamel Arb. v. 2. 320. t. 90, the two lower figures.

## THUJA.

figures. Very bad.)—Young branches two-edged. Leaves imbricated in four rows, compressed, ovate, somewhat rhomboid, with a central furrow. Inner scales of the cone obtuse, with a recurved dorsal point.—Native of rocky situations in China. *Gmelin*. On mountains in Japan. *Thunb. Jap.* 266. A hardy tree in our gardens, which appears to have been cultivated by Miller in 1752. It flowers at the same time as the former, but though a much more handsome tree, is less common. The very copious and crowded young branches are more erect, more slender, and rather less compressed than the former, and the leaves are furrowed, without any resinous dot. The differences between these two species are accurately marked in our specific characters, adopted from Linnæus and Willdenow. The inner scales of the cone in that before us are remarkably hooked. *Gærtner* observes that the wing of its seed is hardly discernible.

3. *Th. articulata*. Jointed Arbor-vitæ. *Vahl. Symb.* v. 2. 96. t. 48. *Desfont. Atlant.* v. 2. 353. t. 252. *Willd. n. 3.* (*Th. aphylla*; *Linn. Sp. Pl.* 1422, as to the synonym of Shaw, and part of the character taken from thence, but not of *Am. Acad.* v. 4. 295; see TAMARIX. *Cypressus fructu quadrivalvi, foliis equiseti instar articulatis*; *Shaw Afric.* n. 188. f. 188.)—Young branches jointed, rather compressed, with four furrows. Leaves minute, concave, pointed, four at the top of each joint; glandular at the back. Cones quadrangular, of four hooked scales.—Native of the mountains of Barbary, where it is not uncommon. A tree from fifteen to thirty feet high, with round branches, the younger ones repeatedly subdivided, in a partly opposite, partly alternate manner, moderately compressed, composed of a series of linear, smooth, brittle joints, from a quarter to half an inch long, and marked with four longitudinal furrows, which are continued to the interstices of the four minute scale-like leaves crowning each of these joints. *Willdenow*, misled by the analogy of other species, and the figures of authors, supposes each joint to be an assemblage of leaves, from which error the faithful descriptions of *Vahl* and *Desfontaines* might have guarded him. *Catkins* terminal, solitary; the males ovate-oblong, of many scales; females roundish, of much fewer. *Fruit* somewhat depressed, about the size of a black currant, with four protuberant angles, and crowned with as many intermediate reflexed points. The scales separate at the angles, but are firmly united at their base. *Seeds* small, with a broad kidney-shaped wing. The late celebrated *Broussonet* observed the resin called Gum Sandarache to be procured from this tree. *Dale* attributes it to the Common Juniper. Such being the history of the species before us, the *Th. aphylla* of Linnæus becomes a non-entity.

4. *Th. dolabrata*. Sculptured Arbor-vitæ. *Linn. Suppl.* 420. *Willd. n. 4.* *Thunb. Jap.* 266. (*Quai*, vulgò *Fi no ki et Ibuki*; *Kämpf. Am.* 884.)—Young branches two-edged, jointed; convex on one side; concave and white on the other; joints obovate. Leaves lateral, opposite, keeled, compressed.—Native of Japan. *Thunberg* observed it in the countries of Oygawa and Fakonia, between Miaco and Jedo; and it was planted along the high road on the hill of Fakonia. He speaks of it as a tree of vast height and dimensions, the most beautiful of all the evergreen tribe. The branches are alternate, repeatedly subdivided, compressed and clothed with imbricated leaves. At first sight the young branches appear covered with four rows of leaves, but the analogy of the foregoing species, even of the first of all, leads us to believe the intermediate row, on each side, is an obovate furrowed joint, inferribly terminating in a short broad leaf, while the more obvious leaves are opposite, laterally inserted into the base of the joint at each side, and about the same

length; each of them strongly compressed, with a thick keel, and incurved point. Their great peculiarity consists in being all convex and green on the upper side of the branch; concave and as if whitewashed, like the furrows of the joints, on the under. This gives the plant an artificial, but most elegant, appearance. The flowers we have not seen. *Kämpfer* says the fruit is warty, the size of a pea.

5. *Th. cupressoides*. African Arbor-vitæ. *Linn. Mant.* 125. *Willd. n. 5.* *Ait. n. 3.* *Thunb. Prodr.* 110. (*Th. aphylla*; *Burm. Prodr.* 27, excluding the reference to Shaw.)—Young branches but slightly compressed. Leaves imbricated in four rows, even. Cones nearly globose, of four acute warty scales.—Native of the Cape of Good Hope, from whence *Dr. Roxburgh* introduced it to Kew Garden in 1799. The growth of the tree is tall and close, like that of the *Cypress*. Leaves closely imbricated, not spreading. *Fruit* of the size and appearance of the *Cypress*, nearly globular, with four obsolete angles, separating into four thick acute valves or scales, tuberculated externally, keeled within. *Seeds* numerous, each terminated by a membranous obovate wing. Linnæus adds to this description, "*Ranuli minime articulati more Equiseti.*" If *minime* be not printed by mistake for *minimi*, we presume this alludes to Shaw's synonym, cited in the *Mantissa* with many scruples, and certainly not belonging to this but to *articulata*, our third species.

THUJA, in *Gardening*, contains plants of the hardy, evergreen tree-kind, of which the species cultivated are, the American arbor-vitæ (*T. occidentalis*); and the Chinese arbor-vitæ (*T. orientalis*).

In the first of these species there are different varieties; as the American sweet-scented, and the variegated-leaved.

*Method of Culture*.—These plants may be increased by seeds, layers, and cuttings. Good seeds should be obtained from the native situations of the trees, and be sown soon after they are ripe, or as soon as they can be obtained, in autumn or spring, in pots or boxes of light earth, covering them half an inch deep, placing the pots, &c. in a sheltered warm situation, or under the shelter of a frame in bad weather, especially when sown in autumn, that they may be protected from severe frosts: they sometimes come up in the spring, but are frequently apt to remain in the ground till the second year. When the plants are come up, the pots should be placed in an east border to have only the morning sun, but open to the free air, giving frequent but very moderate waterings all the summer; and in winter removing the pots again to a sheltered place till spring, when they may be pricked out in nursery-rows; or, when they are small and weakly, continued in the pots another year, placing them in a shady situation during summer, and in a sheltered place in winter; and in the spring following planting them out in the nursery, in rows a foot or two asunder, in order to acquire size and strength for planting out where they are to remain.

The layers should be made from the young shoots of one or two years growth, which may be laid down early in autumn, bending down the branches to the earth, and laying all the young wood in by slit or twist-laying, with the tops only appearing a little above ground; shortening any that have much longer tops than the others: they mostly emit roots in the earth, and form proper plants by the autumn following; when, or rather in spring after, they should be separated from the stools, and be planted in nursery-rows, to remain two or three years, or till of a proper size for the shrubbery, &c.

The cuttings should be made from the strong young shoots of the same year's growth, which should be planted in

in the autumn in a shady border, taking the opportunity of showery weather, if possible, for the business; they should be cut off with a small part of the old wood, where practicable, and be planted in rows a foot asunder, closing the earth well about them: they will be properly rooted in one year for planting out in wider nursery-rows: they may also be planted in pots, and placed in a hot-bed, in order to have them more forward.

And they all may be planted out into the borders, &c. in the autumn or early spring months.

These trees in their native situations grow to very considerable sizes and magnitudes, but in this climate they are of much inferior growths, seldom rising to any great height or thickness. They succeed best in the countries from which they are brought, in rather moist soils; but here they thrive perfectly in any tolerably good common kind, and in any situation. They have a beautiful form of growth, being much and finely branched from their very bottoms, and constantly closely adorned with leaves, which are of a very minute size, and arranged in a curiously compact imbricated manner, displaying a continual verdure and ornamental variety at all times of the year.

They are highly ornamental evergreens, proper for adorning the shrubbery and other parts, having a fine effect also when disposed singly in borders, &c. and in open spaces of grass; in all of which situations they should be suffered to grow with their full branches, in their own natural way, except reducing with a knife any low straggling or rambling branches occasionally: this is all the culture they require afterwards.

They may also be employed as timber-trees, in the evergreen forest-tree plantations.

And those in the pots, as the Chinese *arbor-vitæ*, may be placed among other potted plants to adorn any particular compartment, and in assemblage with greenhouse plants for variety.

THUILLIER, VINCENT, in *Biography*, a learned Benedictine, was born at Coucy, in the diocese of Laon, in 1685; and entered into the congregation of St. Maur in 1703, where he was distinguished for his talents. Having officiated as professor of philosophy and theology in the abbey of St. Germain-des-Près, he was made sub-prior, and died in 1736. With his extensive literature, he combined a lively imagination and a turn for satire, which involved him in several controversies. He first opposed, and then warmly defended the hull "Unigenitus," on which subject he published two treatises. But he was more usefully employed in a French translation of Polybius, which appeared in 1721-28, in 6 vols. 4to. His version is elegant and faithful. Moreri.

THUIN, in *Geography*, a town of France, in the department of Jemappe, on the Sambre; 14 miles S.E. of Mons. N. lat. 50° 20'. E. long. 4° 21'.

THUIR, a town of France, in the department of the Eastern Pyrenées; 7 miles S.W. of Perpignan.

THULDEN, THEODORE VAN, in *Biography*, was one of the most distinguished among the pupils of Rubens, whom he assisted in forwarding the pictures of the Luxembourg gallery. He was born at Bois-le-Duc in 1607. He painted a considerable number of large works for the churches and public buildings of the principal towns and cities in Flanders; some of which have been honoured by being considered as from the hand of Rubens. Among the best of them are the Martyrdom of St. Sebastian, at Mechlin; the Martyrdom of St. Adrian, at Ghent; and the Assumption of the Virgin, formerly in the church of the Jesuits, at Bruges. He was engaged at Paris, which

he visited in 1633, to paint a series of pictures of the life of the patron saint of the Mathurins, St. John of Matha, which he afterwards etched and published in twenty-four plates. He is also the author of several other etchings from his own works and those of others; particularly of 58 plates of the life of Ulysses, from pictures painted at Fontainebleau by Primaticcio, of most of which there is now no other remembrancer than his etchings. He died in 1676, at the age of 69.

THULE, or THYLE, in *Ancient Geography*, an island of the Northern ocean, described in a very vague manner by the ancients; but which some maintain to have been the Shetland isles. Virgil (*Georg.* l. i. v. 30.) and Seneca (*Medea*, v. 379.) call this island "Ultima Thule." It is difficult to ascertain its precise situation. Strabo ascribes the ignorance and uncertainty that prevailed with regard to this island to its great distance, and charges Pytheas with having made many false reports concerning it. Ptolemy places the middle of this island in 63° of latitude, and says, that at the time of the equinoxes, the days were 24 hours, which could not have been true at the equinoxes, but must have referred to the solstices; and, therefore, this island is supposed to have been in 66° 30' lat. or under the polar circle. Stephanus Byzantinus says of this island, "Thula insula magna in oceano sub Hyperboreas partes ubi Ætivus dies ex viginti horis æqualibus constat, nox vero ex quatuor. Hybernæ vero dies é contrario." From this account it appears that the ancients described an island which was situated three degrees on this side of the polar circle; but its situation, if such an island existed, still remained very uncertain. As the ancients have not given us the dimensions of this island, some authors have concluded that the appellation of Thule was given to Scandinavia, of which the ancients had a very imperfect knowledge. According to Procopius (*l. iii. de Bell. Goth. c. 14.*) a party of the Etulians, when vanquished by the Lombards, sought an abode towards the extremities of the earth. With this view they traversed the country of the Slavonians; and in their progress entered into the country of the Varangians, and into Denmark, and at length arrived on the ocean, where they embarked, and then landed on the island of Thule. This island, he adds, is ten times larger than Great Britain, and is far remote from the northern coast, a great part of it being desert. The habitable part was occupied by thirteen different classes of people, who had their respective kings. Towards the summer solstice, the sun appeared 40 days successively above their horizon; six months afterwards, the inhabitants had 40 days of night, which they passed in a state that was truly deplorable, as their commerce was totally interrupted. By the account of Procopius, it appears that the place to which he refers must have been beyond the polar circle, and of course beyond 63° lat., where Ptolemy placed the middle of Thule. Procopius says, that he often wished to visit this island, but was never able to accomplish his object; but he professes to have derived his information from persons who had actually visited the country, and he describes its aspect, and productions, and the manners of its inhabitants. His details correspond to the accounts that have been given of the ancient state of Lapland (which see); but this could not have been the Thule of the ancients. The descriptions transmitted to us from the ancients of their pretended isle of Thule are so intermixed with fabulous and incredible relations, that some modern geographers have even doubted whether such an island as they describe ever existed; others have supposed that they refer to Scandinavia, or some country far distant to the north, of which they could have

no certain and satisfactory accounts; and others again have been of opinion, that no islands to which modern voyagers have had access, correspond more exactly to their reports than the isles of Shetland, N. of Scotland. See *ZETLAND Islands*.

**THULE**, in *Geography*, a town of Westphalia, in the bishopric of Paderborn; 6 miles W.S.W. of Paderborn.

**THULE**, a river of Wales, in the county of Glamorgan, which runs into the Lloghor, near its mouth.

**THULE**, *Southern*, a part of Sandwich Land, observed by Capt. Cook in January 1775, in S. lat.  $59^{\circ} 13' 30''$  and W. long.  $27^{\circ} 45'$ , and so called because it is the most southern land that has ever yet been discovered. It exhibits a surface of vast height, and is every where covered with snow. Some thought that they saw land in the space between Thule and Cape Bristol: Cook thought it more than probable that these two lands are connected, and that this space is a deep bay, which he called Forster's bay.

**THUM**, a town of Saxony, in the circle of Erzgebirg; 7 miles S. of Chemnitz. N. lat.  $50^{\circ} 37'$ . E. long.  $12^{\circ} 50'$ .—Also, a town of Bavaria, in the bishopric of Bamberg; 3 miles S.S.W. of Forchheim.

**THUMATA**, in *Ancient Geography*, a town of the Arabs, placed by Pliny on the banks of the Tigris, at a considerable distance from the town of Petra.

**THUMATHA**, a town situated in the interior of Arabia Felix, between Chabuata and Olaphia. Ptol.

**THUMB**, **POLLEX**, in *Anatomy*, one of the members or parts of the hand. See *EXTREMITIES*.

**THUMB-Stall**, a ferrule made of iron, horn, or leather, with the edges turned up, to receive the thread in making sails. It is worn on the thumb to tighten the stiches while sewing.

**THUMELITHA**, in *Ancient Geography*, a town of Africa, in Interior Libya, near the source of the river Cinyphis. Ptol.

**THUMERVILLE**, in *Geography*, a town of France, in the department of the Moselle; 6 miles S.W. of Briey.

**THUMERSTONE**, in *Mineralogy*: *Asinite*, Häüy. This mineral was called Thumerstone by Werner, from Thum, in Saxony, the place where it was found; and *Axinite* by Häüy, from the flattened sharp edges of the crystals resembling the edge of an axe. This is the first character which strikes the eye when this mineral is presented for inspection. It is most commonly found crystallized, but sometimes massive or disseminated. The form of the crystals is a very compressed oblique rhomboidal prism. The primitive crystal, according to Häüy, is a four-sided prism, whose bases are parallelograms with very oblique angles: the larger angle being  $101.32$ , and the smaller  $78.28$ . In the secondary crystals, the acute edges are generally truncated. It is crystallized also in oblique four-sided tables. The form of the crystals is sometimes very difficult to be determined; they not unfrequently intersect one another, forming a cellular aggregation. The external lustre is generally splendid; internally it is glistening or shining, and is vitreous. It is transparent or translucent. The fracture is fine-grained and uneven; in the translucent varieties, it sometimes approaches to splintery; and in the transparent varieties, to the small and imperfectly conchoidal. It scratches glass; is harder than felspar, but not so hard as quartz; it is fragile, and fusible by the blow-pipe into a greenish-white glass, but if laid on charcoal into a black glass. The specific gravity is from 3.2 to 3.3. The colours of this mineral are most commonly a clove-brown of various degrees of intensity, inclining to violet and green.

It is sometimes green and opaque: according to Brongniart, this is owing to a mixture of chlorite. It has been observed, he remarks, that the crystals which are coloured with this earth are the most regular. The constituent parts are given by Klaproth and Vauquelin as under.

	Klaproth.	Vauquelin.
Silex - - -	52.70 and 50.50	44
Alumine - -	25.79	18
Lime - - -	9.39	17.
Oxyd of iron -	8.63	9.50
Oxyd of manganese	1.	5.25
Potash - - -		0.25
		4

This mineral occurs in Saxony, France, Switzerland, and Spain, and at mount Atlas, in Africa. It is found also massive and crystallized near St. Just, in Cornwall, at the Botellock mine, associated with common garnet, and in veins between Marazion and Penzance.

The most beautiful variety is met with in a rock of serpentine, near Balme d'Auris, in Dauphiny, in the department of the Isère, where it generally occurs in well-defined crystals, sometimes colourless and transparent, but more frequently of a dull reddish-violet colour, whence it obtained the name of violet schorl of Dauphiny. The crystals of thumerstone, which are not symmetrical, become electric by heat: it is indeed a general law, that all minerals which possess the pyro-electric property, are defective in the symmetry of the crystals.

**THUMLITZ**, in *Geography*, a river of Saxony, which runs into the Mulda; 3 miles S. of Grima.

**THUMMIM**, in the *Scripture Learning*. See **URIM** and **THUMMIM**.

**THUMNA**, in *Ancient Geography*, the name of two towns situated in the interior of Arabia Felix; one between Mochura and Aluare, and another between Mariama and Vodona. Ptol.

**THUN**, in *Geography*, a town of Switzerland, in the canton of Bern, at the distance of about 12 miles from the town of Bern. It occupies the bottom and brow of a hill, and stretches on both sides of the Aar. It contains 1200 inhabitants, enjoys considerable immunities, has its own magistrates and courts of justice, in which the bailiff from Bern always presides, and from whose decision an appeal always lies to the capital. The inhabitants employ themselves in carding and spinning silk for the manufactures of Basle. Some of the burghers possess large herds of cattle. To the N.E., on an eminence, stand the church, and the castle, which is the residence of the bailiff. N. lat.  $46^{\circ} 44'$ . E. long.  $7^{\circ} 31'$ .—Also, a lake of Switzerland, in the canton of Bern; about four leagues long, and one broad, and probably very deep: the borders are richly variegated, and present several fine points of view, much heightened by many rugged rocks rising boldly from the margin of the water. The river Aar passes through the lake of Brienz, and then enters that of Thun, from which it is again discharged, passing between two level promontories, prettily sprinkled with trees, on one of which stands the castle of Schadao; 15 miles S.S.E. of Bern.

**THUNA**, a town of Cachemire; 45 miles S. of Cachemire.

**THUNBERGIA**, in *Botany*, received that name first from professor Retzius, and next in the *Supplementum Plantarum*, from the pen of the younger Linnæus, in honour of their mutual friend, sir Charles Peter Thunberg, knight of the order of Wafa, by whose discoveries that work was peculiarly enriched with new and curious species, especially from the Cape of Good Hope. This illustrious veteran still

sits in the professorial chair of Rudbeck and Linnæus at Upsal, after having essentially added to the general stock of knowledge by his Travels to Japan, his Floras of that country and of the Cape, and his very numerous academical dissertations. The liberal communications, and amiable character of professor Thunberg, have secured him no less personal esteem than his extensive application and knowledge. His constitution, though shaken by a terrible misfortune in his voyage, the accidental use of white lead in his food, which proved fatal to some of his mess-mates, has still carried him on to the advanced age of 73.—Retz. Act. Lund. v. 1. 163. Linn. Suppl. 46. Schreb. Gen. 426. Willd. Sp. Pl. v. 3. 388. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 65. Thunb. Nov. Gen. 21. Prodr. 106. Juss. 103. Lamarec Illustr. t. 549.—Class and order, *Didymia Angiospermia*. Nat. Ord. *Personate*, Linn. *Acanthi*, Juss.

Gen. Ch. Cal. Perianth inferior, double, permanent: the outermost of two ovate, obtuse, ribbed, equal leaves, as long as the tube of the corolla: inner of one leaf, in many, about twelve, awl-shaped erect segments, not one-third so long as the former. Cor. of one petal, falver-shaped: tube gradually dilated upwards: limb in five deep, nearly equal, obovate, very abrupt segments, about half the length of the tube. Stam. Filaments four, awl-shaped, inserted into the tube, the two lower ones shortest, all included within the tube; anthers arrow-shaped. Pist. Germen superior, roundish; style thread-shaped, erect, hardly so long as the tube; stigma of two rounded flat lobes. Peric. Capsule globose with a beak, smooth, or two cells and two valves, bursting lengthwise: the beak linear, obtuse, compressed, furrowed; partition obovate, emarginate, perforated below the summit, membranous at the sides, permanent. Seeds two in each cell, kidney-shaped, rugged, convex on the outside, concave on the inner, with a longitudinal furrow.

Ess. Ch. Calyx double; the outer of two leaves; inner in many awl-shaped segments. Corolla falver-shaped, with five regular lobes. Capsule beaked, of two cells.

Obs. Linnæus remarks that this genus agrees in many points with *Barleria*. Thunberg takes the outer calyx-leaves for bractæas, but this is not countenanced by the altogether peculiar appearance of the inner calyx, by no means like an external perianth.

1. *T. capensis*. Diffuse Thunbergia. Linn. Suppl. 292. Willd. n. 1. Retz. Act. Lund. v. 1. 163, with a figure.—Leaves roundish-ovate, obtuse. Stem diffuse.—Native of the Cape of Good Hope. The root seems to be perennial. Stems a finger's length, diffuse, simple, leafy, square, hairy. Leaves opposite, on short hairy stalks, entire or somewhat toothed, hardly an inch long, strongly reticulated with veins: very rough with minute bristles above; hairy beneath. Flowers yellow, on simple, solitary, striated, erect, axillary, hairy stalks, twice the length of the leaves. Outer calyx very hairy; inner rigid, with almost pungent points. Corolla about an inch long, its segments somewhat rounded. Capsule rigid, about the same length.

2. *T. fragrans*. Twining Thunbergia. Roxb. Corom. v. 1. 47. t. 67. Willd. n. 2. Ait. n. 1. Andr. Repof. t. 123.—Leaves ovate-oblong, somewhat heart-shaped, acute. Stem twining.—Common in hedges, among bushes, on the banks of water-courses, about Samulcotah, flowering in the wet and cold seasons. Dr. Roxburgh never met with it any where else. He says the plant possesses a peculiar and agreeable fragrance, and the beauty of its flowers, though not fragrant, entitles it to a place in the flower-garden. No scent has been discovered in any part of this plant in our stoves, where it blossoms freely all summer long. The long

and twining stems readily distinguish this species from the foregoing, as well as the elongated form of the leaves, which are occasionally angular, or toothed, near the base. The flowers are white, larger, and with a narrower tube than the *capensis*, their segments more abrupt or somewhat notched.

It appears by the Linnæan herbarium that the younger Linnæus had originally defined the name of *Solandra* for this genus.

Another *Thunbergia* was previously established by Dr. Montin, in the Stockholm Transactions for 1773, but the noble plant on which it was founded proved a *GARDENIA*. See that article.

THUNDER, a noise in the lowest region of the air, excited by a sudden explosion of electrical clouds; which, on this account, are called thunder-clouds.

Seneca, Rohault, and other authors, both ancient and modern, account for thunder by supposing two clouds impending over one another, the upper and rarer of which, becoming condensed by a fresh accession of air raised thither by warmth from the lower parts of the atmosphere, or driven upon it by the wind, immediately falls forcibly down upon the lower and denser cloud: by which fall the air interposed between the two being compressed, that next the extremities of the two clouds is squeezed out, and leaves room for the extremity of the upper cloud to close tight upon the under; thus a great quantity of air is enclosed, which, at length escaping through some winding irregular vent or passage, occasions that noise which we call thunder.

But this could only reach to the phenomena of thunder heard without lightning; and, therefore, recourse has been had to another solution. It has been said, that thunder is not occasioned by the falling of clouds, but by the kindling of sulphurous exhalations, in the same manner as the noise of aurum fulminans.

“There are sulphurous exhalations,” says sir Isaac Newton, “always ascending into the air when the earth is dry; there they ferment with the nitrous acids, and sometimes taking fire, generate thunder, lightning, &c.”

That, besides the vapours raised from water, &c. there are also exhalations carried off from sulphur, bitumen, volatile salts, &c. is past all doubt; the vast quantity of sulphurous and bituminous matter all over the surface of the earth, and the volatile salts of plants and animals, afford such an ample stock of them, that it is no wonder the air should be filled with such particles, raised higher or lower, according to their greater or less degree of subtlety and activity; and more copiously spread in this or that quarter, according to the direction of the winds.

Now, the effects of thunder are so like those of fired gunpowder, that Dr. Wallis thinks we need not scruple to ascribe them to the same cause; and the principal ingredients in gunpowder, we know, are nitre and sulphur; charcoal only serving to keep the parts separate, for their better kindling.

Hence, if we conceive in the air a convenient mixture of nitrous and sulphurous particles, from the sources above mentioned; and those, by any cause, to be set on fire, such explosion may well follow; and with such noise and light, the two phenomena of thunder, as in the firing of gunpowder; and being once kindled, it will run from place to place, this way or that, as the exhalations happen to lead it; much as is found in a train of gunpowder.

This explosion, if high in the air, and remote from us, will do no mischief; but if near us, may destroy trees, animals, &c. as gunpowder would do in the like circumstances.

This nearness, or distance, may be estimated by the interval

terval of time between the flash and the noise. Dr. Wallis observes, that, ordinarily, the difference between the two is about seven seconds, which, at the rate of 1142 feet in a second of time, gives the distance about a mile and a half; but sometimes it comes in a second or two, which argues the explosion very near us, and even among us. And in such cases, the doctor assures us, he has more than once foretold the mischiefs that happened.

Upon the whole, that there is in lightning a sulphurous vapour has been argued from the smell of sulphur which attends it, and from the sultry heat in the air which usually precedes it; and that there is a nitrous vapour along with it, the same writer concludes hence, that we know of no other body so liable to a sudden and violent explosion. And as to the kindling of these materials, we know that a mixture of sulphur and steel-filings, with a little water, will of itself break forth into actual flame. Nothing, therefore, is wanting to the explosion but some chalybeate or vitriolic vapour; and, among the various effluvia from the earth, the doctor does not doubt but there must be some of that kind; but, in proof of what he leaves as a probability, the following facts have been alleged.

In history, we meet with instances of its raining iron in Italy, and iron-stones in Germany. Jul. Scaliger tells us, he had by him a piece of iron rained in Savoy. Cardan reports 1200 stones to have fallen from heaven, some of them weighing 30, some 40, and one 120 pounds, all very hard, and of the colour of iron.

The matter of fact is so well attested, that Dr. Lister, in the Philosophical Transactions, builds a whole theory of thunder and lightning on it; maintaining that they both owe their matter to the vapour or exhalation of the pyrites.

The noise of thunder, and the flame of lightning, are easily made by art. If a mixture of oil or spirit of vitriol be made with water, and some filings of steel added to it, there will immediately arise a thick smoke or vapour out of the mouth of the vessel; and if a lighted candle be applied to this, it will take fire, and the flame immediately descend into the vessel, and this will be burst to pieces with a noise like that of a cannon.

This is so far analogous to thunder and lightning, that a great explosion and fire are occasioned by it; but in this they differ, that this matter when once fired is destroyed, and can give no more explosions; whereas, in the heavens, one clap of thunder usually follows another, and there is a continued succession of them for a long time. M. Homberg explained this by the lightness of the air above us in comparison of that here, which therefore would not suffer all the matter so kindled to be dissipated at once, but kept it for several returns.

Ever since the year 1752, in which the identity of the matter of lightning, and of the electric fluid, has been ascertained, philosophers have generally agreed in considering thunder as a concussion produced in the air by an electrical explosion. For the illustration and proof of this theory, see LIGHTNING. See also ELECTRICITY.

We shall here observe, that Mr. Henry Eeles, in a letter written in 1751, and read before the Royal Society in 1752, considers the electrical fire as the cause of thunder, and endeavours to account for it on this hypothesis; and he tells us, that he did not know of any person's having made the same conjecture. Phil. Trans. vol. xlvii. p. 524, &c.

That rattling in the noise of thunder, which makes it seem as if it passed through arches, or were broken variously, is probably owing to the sound being excited among clouds

hanging over one another, and the agitated air passing irregularly between them.

See this phenomenon particularly accounted for under LIGHTNING.

**THUNDER-Bolt.** If what we call lightning acts with extraordinary violence, and breaks or shatters any thing, it is called a thunderbolt, which the vulgar, to fit it for such effects, suppose to be a hard body, and even a stone.

But that we need not have recourse to a hard solid body to account for the effects commonly attributed to the thunderbolt, will be evident to any one, who considers those of the pulvis fulminans, and of gunpowder: but more especially the astonishing powers of electricity, even when collected and employed by human art, and much more when directed and exercised in the course of nature.

When we consider the known effects of electrical explosions, and those produced by lightning, we shall be at no loss to account for the extraordinary operation vulgarly ascribed to thunderbolts. As stones and bricks struck by lightning are often found in a vitrified state, we may reasonably suppose, with signior Beccaria, that some stones in the earth, having been struck in this manner, first gave occasion to the vulgar opinion of the thunderbolt.

Places struck with thunderbolts were held sacred among the ancients. Nigidius has a curious treatise on the thunderbolt.

The ancient painters and poets have armed Jupiter with a sort of flaming dart, called a thunderbolt. Thus, it is said, he became master both of gods and men.

These thunderbolts are forged for Jupiter, according to the poets, by the Cyclopes.

The thunderbolt, in antiquity, represented sovereignty, and a power equal to the gods; on this account, Apelles painted Alexander, in the temple of Diana of Ephesus, holding a thunderbolt in his hand: and on medals, the thunderbolt is sometimes found to accompany the emperor's heads, as that of Augustus.

Appian informs us, that the thunderbolt was the principal divinity of Seleucia; adding, that it was adored, even in his time, with various hymns and ceremonies.

**THUNDER-Clouds,** in *Physiology*, are those clouds which are in a state fit for producing lightning and thunder. From signior Beccaria's exact and circumstantial account of the external appearances of thunder-clouds, we shall extract the following particulars.

The first appearance of a thunder-storm, (which generally happens when there is little or no wind), is one dense cloud, or more, increasing very fast in size, and rising into the higher regions of the air. The lower surface is black, and nearly level; but the upper finely arched, and well defined. Many of these clouds often seem piled upon one another, all arched in the same manner; but they keep continually uniting, swelling, and extending their arches.

At the time of the rising of this cloud, the atmosphere is generally full of a great number of separate clouds, motionless, and of odd and whimsical shapes. All these, upon the appearance of the thunder-cloud, draw towards it, and become more uniform in their shapes as they approach, till, coming very near the thunder-cloud, their limbs mutually stretch towards one another; they immediately coalesce, and together make one uniform mass. These he calls *adscititious* clouds, from their coming in, to enlarge the size of the thunder-cloud.

But sometimes the thunder-cloud will swell, and increase very fast, without the conjunction of any adscititious clouds; the vapours in the atmosphere forming themselves into clouds

wherever it passes. Some of the adscitious clouds appear like white fringes at the skirts of the thunder-cloud, or under the body of it, but they keep continually growing darker and darker, as they approach to unite with it.

When the thunder-cloud is grown to a great size, its lower surface is often ragged, particular parts being detached towards the earth, but still connected with the rest. Sometimes the lower surface swells into various large protuberances, bending uniformly toward the earth. And sometimes one whole side of the cloud will have an inclination to the earth, and the extremity of it will nearly touch the earth. When the eye is under the thunder-cloud, after it is grown larger, and well formed, it is seen to sink lower, and to darken prodigiously; at the same time that a number of small adscitious clouds (the origin of which can never be perceived) are seen in a rapid motion, driving about in very uncertain directions under it. While these clouds are agitated with the most rapid motions, the rain generally falls in the greatest plenty, and if the agitation be exceedingly great, it commonly hails.

While the thunder-cloud is swelling, and extending its branches over a large tract of country, the lightning is seen to dart from one part of it to another, and often to illuminate its whole mass. When the cloud has acquired a sufficient extent, the lightning strikes between the cloud, and the earth, in two opposite places, the path of the lightning lying through the whole body of the cloud and its branches. The longer this lightning continues, the rarer does the cloud grow, and the less dark is its appearance; till, at length, it breaks in different places, and shews a clear sky. When the thunder-cloud is thus dispersed, those parts which occupy the upper regions of the atmosphere are equally spread, and very thin; and those that are underneath are black, but thin too; and they vanish gradually, without being driven away by any wind.

These thunder-clouds were sometimes in a positive as well as negative state of electricity. The electricity continued longer of the same kind, in proportion as the thunder-cloud was simple and uniform in its direction; but when the lightning changed its place, there commonly happened a change in the electricity of the apparatus over which the clouds passed. It would change suddenly after a very violent flash of lightning, but the change would be gradual when the lightning was moderate, and the progress of the thunder-cloud slow. Beccar. Lettere dell' Ellettricismo, p. 107; or Priestley's Hist. Electr. vol. i. p. 397, &c. See LIGHTNING.

*THUNDER-HOUSE*, in *Electricity*, is an instrument invented by Dr. James Lind of Edinburgh, for illustrating the manner by which buildings receive damage from lightning, and to evince the utility of metallic conductors in preserving them from it.

A (*Plate XV. Electricity, fig. 2.*) is a board about three quarters of an inch thick, and shaped like the gable-end of a house. This board is fixed perpendicularly upon the bottom board B, upon which the perpendicular glass pillar CD is also fixed in a hole about eight inches distant from the basis of the board A. A square hole ILMK, about a quarter of an inch deep, and nearly an inch wide, is made in the board A, and is filled with a square piece of wood, nearly of the same dimensions. It is nearly of the same dimensions, because it must go so easily into the hole, that it may drop off, by the least shaking of the instrument. A wire, LK, is fastened diagonally to this square piece of wood. Another wire, IH, of the same thickness, having a brass ball, H, screwed on its pointed extremity, is fastened upon the

board A: so also is the wire MN, which is shaped in a ring at O. From the upper extremity of the glass pillar CD, a crooked wire proceeds, having a spring socket F, through which a double knobbed wire slips perpendicularly, the lower knob, G, of which falls just above the knob H. The glass pillar DC must not be made very fast into the bottom board; but it must be fixed so that it may be pretty easily moved round its own axis, by which means the brass ball G may be brought nearer or farther from the ball H, without touching the part EFG. Now when the square piece of wood LMIK (which may represent the shutter of a window or the like) is fixed into the hole so that the wire LK stands in the dotted representation IM, then the metallic communication from H to O is complete, and the instrument represents a house furnished with a proper metallic conductor; but if the square piece of wood LMIK is fixed so that the wire LK stands in the direction LK, as represented in the figure, then the metallic conductor HO, from the top of the house to its bottom, is interrupted at IM, in which case the house is not properly secured.

Fix the piece of wood LMIK, so that its wire may be as represented in the figure, in which case the metallic conductor HO is discontinued. Let the ball G be fixed at about half an inch perpendicular distance from the ball H, then, by turning the glass pillar DC, remove the former ball from the latter; by a wire or chain connect the wire EF with the wire Q of the jar P, and let another wire or chain, fastened to the hook O, touch the outside coating of the jar. Connect the wire Q with the prime conductor, and charge the jar; then, by turning the glass pillar DC, let the ball G come gradually near the ball H, and when they are arrived sufficiently near one another, you will observe, that the jar explodes, and the piece of wood LMIK is pushed out of the hole to a considerable distance from the thunder-house. Now the ball G, in this experiment, represents an electrified cloud, which, when it is arrived sufficiently near the top of the house A, the electricity strikes it, and as this house is not secured with a proper conductor, the explosion breaks part of it, *i. e.* knocks off the piece of wood IM.

Repeat the experiment with only this variation, *viz.* that this piece of wood IM is situated so that the wire LK may stand in the situation IM; in which case the conductor HO is not discontinued; and you will observe that the explosion will have no effect upon the piece of wood LM, this remaining in the hole unmoved; which shews the usefulness of the metallic conductor.

Farther, unscrew the brass ball H from the wire HI, so that this may remain pointed, and with this difference only in the apparatus repeat both of the above experiments, and you will find that the piece of wood IM is in neither case moved from its place, nor any explosion will be heard, which not only demonstrates the preference of conductors with pointed terminations to those with blunted ones, but also shews that a house furnished with sharp terminations, although not furnished with a regular conductor, is also sufficiently guarded against the effects of lightning.

Mr. Henly, having connected a jar containing 509 square inches of coated surface with his prime conductor, observed that if it was so charged as to raise the index of his electrometer to 60°, by bringing the ball on the wire of the thunder-house, to the distance of half an inch from that connected with the prime conductor, the jar would be discharged, and the piece in the thunder-house thrown out to a considerable distance. Using a pointed wire for a conductor to the thunder-house, instead of the knob, the charge being the same

fame as before, the jar was discharged silently, though suddenly; and the piece was not thrown out of the thunder-house. In another experiment having made a double circuit to the thunder-house, the first by the knob, the second by a sharp-pointed wire, at one and one-fourth of an inch distance from each other, but of exactly the same height (as in *fig. 3.*) the charge being the same; although the knob was brought first under that connected with the prime conductor, which was raised half an inch above it, and followed by the point, yet no explosion could fall upon the knob; the point drew off the whole charge silently, and the piece in the thunder-house remained unmoved. *Phil. Traus. vol. lxiv. part i. p. 136. See POINTS, in Electricity.*

**THUNDER-Stone**, in *Natural History*, the same with that called by authors *brontia*.

**THUNDER-Storm**. See **THUNDER-Clouds**.

**THUNDER Bay**, in *Geography*, a bay in lake Huron, about nine miles long, and nearly as many broad. The Indians who reside near, and all European travellers who have passed this bay, agree to call it by the present name, on account of the continual thunder they observe. N. lat. 44° 50'. W. long. 83° 30'.—Also, a bay on the N. part of lake Superior.

**THUNDERING LEGION**, *Legio Fulminans*, was a legion in the Roman army, consisting of Christian soldiers, who in the expedition of the emperor Marcus Aurelius Antoninus against the Sarmatæ, Quadi, and Marcomanni, A.D. 174, are said to have saved the whole army, then ready to perish with thirst, by procuring, with their prayers, a very plentiful shower on them; and at the same time a furious hail, mixed with lightning and thunderbolts, on the enemy, and thus he obtained a decisive victory.

This is the account commonly given by ecclesiastical historians; and the whole story is engraven in bas-reliefs on the Antonine column. And hence arose the denomination *thunderers*: though some say, that the legion those Christians were of was called the *thundering legion* before.

This deliverance has been thought by many to have been miraculous, owing to the prayers of the Christians who were in the Roman army; and it has been supposed, that the emperor wrote a letter to the senate on this occasion, which was very favourable to the Christians; others, however, have thought, that the Christians, by a pious sort of mistake, attributed this unexpected and seasonable shower, which saved the Roman army, to a miraculous interposition; and this opinion, says Mosheim, is indeed supported by the weightiest reason as well as by the most respectable authorities; and the letter of Marcus Antoninus is allowed, even by the defenders of the miracle of the thundering legion, to have in it manifest tokens of spurioufness, to be the work of a man unskilful in Roman affairs, and who probably lived in the seventh century. Mosheim sums up the arguments on this subject in the following manner: it is certain, he says, that the Roman army enclosed by the enemy, and reduced to the most deplorable and even desperate condition by the thirst under which they languished in a parched desert, was revived by a sudden and unexpected rain. It is also certain, that both the Heathens and the Christians looked upon this event as extraordinary and miraculous; the former attributing it to Jupiter, Mercury, or the power of magic; the latter to Christ, interposing, thus unexpectedly, in consequence of their prayers. It is still farther beyond all doubt, that a considerable number of Christians served, at this time, in the Roman army, and it is extremely probable, that in such trying circumstances of calamity and distress, they employed the merciful interposition and succours of their God and Saviour. And as the Christians of the time looked

upon all extraordinary events as miracles, and ascribed to their prayers all the uncommon and singular occurrences of an advantageous nature that happened to the Roman empire, it will not appear surprising, that upon the present occasion they attributed the deliverance of Antoninus and his army to a miraculous interposition which they had obtained from above. But, on the other hand, it must be carefully observed, that it is an invariable maxim universally adopted by the wise and judicious, that no events are to be esteemed miraculous, which may be rationally attributed to natural causes, and accounted for by a recourse to the ordinary dispensations of providence; and as the unexpected shower, which restored the expiring force of the Romans, may be easily explained without rising beyond the usual and ordinary course of nature, the conclusion is manifest; nor can it be doubtful in what light we are to consider that remarkable event. *Ecc. Hist. vol. i. 8vo. edit.*

Mr. Moyle and Mr. King had a curious and interesting controversy on the subject of the thundering legion. The learned Dr. Lardner has collected into one view every thing relating to it of importance, in his *Collection of Jewish and Heathen Testimonies*, vol. ii. ch. xv. sect. iii. p. 221, &c.

**THUNGEN**, in *Geography*. See **TIENGEN**.

**THUNOE**, a small island of Denmark, between the coast of Jutland, and the island of Samsoe. N. lat. 55° 58'. E. long. 10° 27'.

**THUNUDROMUM**, in *Ancient Geography*, a town, with the title of a Roman colony, in Africa, in New Numidia, according to Ptolemy. It is named *Tynidrumense Oppidum* by Pliny.

**THUNUSDA**, a town of Africa Propria, according to Ptolemy, denominated by Pliny *Thunusidense Oppidum*.

**THUPÆ**, or **THUPPÆ**, a town of Africa, in the interior of Libya, upon the southern banks of the Niger. *Ptol.*

**THUPPA**, a town of Africa, in the interior of Libya, upon the northern bank of the river Gira.

**THUR**, in *Geography*, a river of Switzerland, which rises in the south part of the county of Toggenburg, and runs into the Rhine, 7 miles S.S.W. of Schaffhausen.

**THURE**, a town of France, in the department of the Vienne; 4 miles W. of Châtellerault.

**THUREN**, a river of France, which rises in the department of the Upper Rhine, passes by Thann, &c. and joins the Ill at Ensisheim.

**THURGAU**, a country of Switzerland, with the title of landgravate; bounded on the north by Swabia and the lake of Constance, on the east by the lake of Constance, on the south by the territories of St. Gall, and on the west by the cantons of Zurich and Schaffhausen. It receives its name from the river Thur, and, in its most extensive sense, comprehends all the extent of country on both sides of that river. Though somewhat mountainous towards the south, yet it affords rich pastures; and its other parts, as approaching nearer to levels, produce plenty of grain, with vegetables and fruits of all kinds, as also wine. The country is populous, and well cultivated, containing six towns, with several handsome burghs, a great number of seats, and upwards of 170 villages. About one-third of the inhabitants consists of Roman Catholics, and in church affairs are subject to the bishop of Constance. The other two-thirds, ever since the year 1543, have been Calvinists. The Thurgau is a very ancient landgravate, which, on the extinction of the counts of Old or Hohen Frauenfelden, devolved to those of Kiburg, and, on their failure, to the counts of Habsburg, with whom it came to the house of Austria, which continued possessed of it till 1460, in which year the Switzers, being at war with the archduke Sigismund, wrested this country from him, which,

by the peace concluded at Constance in the following year, was confirmed to them. The cantons to which the territorial sovereignty of this country belongs, are the eight old cantons of Zurich, Bern, Lucerne, Schwitz, Underwalden, Zug, and Glaris; but it was not till the peace of Arau, that the second was admitted by the others as a co-sovereign. These eight every two years alternately appoint a landvogt over it, who resides at Frauenfeld; and since the year 1449, the cantons of Friburg and Soleure have also obtained a seat in its criminal court.

**THURGOLAND**, a township of Yorkshire, in the West Riding; 4 miles S.W. of Barnesley.

**THURIA**, in *Ancient Geography*, a town of Messenia, on the river Aris, S.W. of Alagonia. It had a temple dedicated to the goddesses Astarte, a Syrian divinity, supposed to be the same with Venus.—Also, an island on the *Ægean* sea, near Naxos, according to Plutarch.

**THURIBULUM**, among the Romans, a censor, or vessel, in which incense was burnt at sacrifices.

**THURIFICATI**, in *Church History*, a designation given to those who, to avoid the persecution of the Roman emperors, offered frankincense to the heathen gods.

**THURII MONTES**, in *Ancient Geography*, mountains of Italy, in Magna Græcia.

**THURINGII**, **THURINGIANS**, a people of Germany, supposed by some authors to have been a part of the Vandals. They have been scarcely known in history since the fall of the Roman empire. Towards the end of the fifth or commencement of the sixth century, Thuringia had a king, or at least a warlike chief.

**THURINGIA**, in *Geography*, a circle of Saxony, which forms the N. part of the landgravate of that name. The country is well watered, yields good pasturage, and abundance of corn, particularly wheat, which is excellent, as also fine timber-wood, safflower, anise, fennel, and wine; and has also a considerable breed of horses, horned cattle, and sheep. Of these natural productions of the country, a great part is exported. Thuringia contains in it 60 towns, 674 villages, and 300 noble estates. The modern Thuringia, which lies nearly between the Saale and the Werra, is but a part of the ancient Thuringia, a country formerly comprized under that name, extending itself much farther every way. In the sixth century, the Franks and Saxons subjected the Thuringians to their dominions, whose country from that time forwards became divided into the North and South. North Thuringia, towards the N., extends itself beyond Harzwalde, quite to the river Elbe, and belonged to the Saxons. It was united with the duchy of Saxony, lost its name, and was at length annexed to Eastphalia, or to the eastern part of the county of Saxony. South Thuringia belonged to the Franks, and comprized in it the modern Thuringia, together with a large share of the modern Franconia, Hesse, &c. Till the eleventh century, it stood under the emperors and kings, and besides the counts, we find also some dukes mentioned, to whom the German kings entrusted the government of this country. Ever since the thirteenth century, the margraves of Meissen, who afterwards became electors of Saxony, have been in possession of the landgravate of Thuringia, which was at one time divided among separate lines, but returned again by the extinction of the latter to that of Meissen. It has been ceded to Prussia by the king of Saxony.

**THURIS**, in *Ancient Geography*, a town situated in the interior of Arabia Felix. Ptol.

**THURIUM**, a town which succeeded the ancient *Sybaris*; which see.

**THURLES**, in *Geography*, a post-town of the county

of Tipperary, Ireland, situate on the river Suire, which divides it nearly into two equal parts. There was formerly a castle belonging to the knights of St. John of Jerusalem, and there are still some ruins of a monastery. Thurles is 70 miles S.W. from Dublin.

**THURLMERE**, a lake of England, in the county of Cumberland, from whence a river runs to the Derwent; 3 miles S.E. of Kefwick.

**THURLOE**, JOHN, in *Biography*, secretary of state to the Protectorate, was the son of Thomas Thurloe, rector of Abbot's Roding, in Essex, where he was born in 1616. He was brought up to the law, and in 1644-5, by the interest of Oliver St. John, was appointed one of the secretaries to the parliamentary commissioners at the treaty of Uxbridge. Advancing through other offices, he went as secretary to lord chief justice St. John, and Mr. Strickland, in their embassy to the States-General. In 1652 he rose to the office of secretary to the council of state; and when Cromwell, in 1653, assumed the protectorate, he was nominated his secretary, on whom he reposed peculiar confidence. In 1655 he was entrusted with the management of the post-office; and in 1656 he represented the isle of Ely in parliament. On the death of Cromwell he signed the order for proclaiming Richard, and in the following parliament was returned member for the university of Cambridge. He retained his office of secretary under Richard, and also under the parliament that deposed him. On the restoration, he was accused of high treason and examined, but soon set at liberty. He then retired to his seat in Oxfordshire, and visited London, at his chambers in Lincoln's Inn, in term-time. Charles II. often invited him to take a part in his administration: but he declined it, alleging that perhaps he should not be able to serve the king, as he had done the protector, in connection with men of different characters and principles; the protector, as he told his majesty, was used "to seek out men for places, and not places for men." The abilities of Thurloe for public life were distinguished, and his character in private life no less amiable. He died in Lincoln's Inn, where he was master of the bench, in 1667-8, and was interred in the chapel. His state papers formed a valuable historical collection, and were published by Dr. Birch, in 7 vols. fol. 1742. *Biog. Brit. Gen. Biog.*

**THURLOW**, in *Geography*, a township of Upper Canada.

**THURLOW'S ISLAND**, a narrow island in the Pacific Ocean, near the coast of North America, about 24 miles in length from E. to W. N. lat. 50° 24'. E. long. 233° 35'.

**THURMAN**, a post-township of the United States, in the state of New York, and county of Washington, erected in 1792 from Queensbury, and then comprising a great extent of territory, which has been since subdivided into other towns. Thurman is bounded N. by Chester and Johnsbury, E. by Caldwell and Bolton, S. by Saratoga county, and W. by Montgomery county. The first settlements commenced about 1786, and in 1810 there were about 200 families, mostly Scots, and the rest from the eastern states. It has one Presbyterian and one Methodist meeting-house, and a pretty competent number of common school-houses and schools. The whole township is well watered, and Crain's mountain in the W. part of it is rich in mineral treasures. Much of this western part is still unsettled.

**THURN**, a town of the duchy of Stiria; 5 miles S. of Windisch Gratz.

**THURN Am Hardt**, a town of the duchy of Carniola; 2 miles S. of Gureckfeld.

**THURNAU**, a town of Germany, in the principality of Culmbach; 5 miles S.S.W. of Culmbach. N. lat. 50° 2'. E. long. 11° 26'.

**THURNEISSER, LEONARD**, in *Biography*, a man of great temporary celebrity in chemistry and the occult sciences, was born at Basle in the year 1530. Having imprudently, in 1547, when a boy, married a widow, who proved unfaithful; and having involved himself in debt, he found himself under a necessity of leaving both his wife and his native place. Accordingly, in 1548 he went to Strasburg, and from thence he proceeded to Constance, having, by diligent application to his trade of a goldsmith, amassed a considerable sum of money. He employed himself in the construction of mathematical instruments, and in a variety of metallurgic operations with such reputation, that he was entrusted with the direction of the smelting works at Eberwold in the Tyrol. During his abode at Constance, he married the daughter of a goldsmith by whom he had been employed, and in 1558 retired with her to Tarenz in the Upper Innthal, where he formed metallurgic establishments on his own account, and constructed furnaces, together with a manufactory for the preparation of sulphur. Here he was visited by several persons of eminence, and became known to the emperor Ferdinand; and patronised by the emperor's son, the archduke Ferdinand, he travelled, by his consent, in 1560, to Scotland and the Orkney islands, and in 1561 to Portugal and Spain, and also to some parts of Africa and Asia. On the summit of mount Sinai he received the order of St. Catharine; and in his way home he visited Candia, Greece, Italy, and Hungary. When he arrived in the Tyrol, he found his establishments in great confusion; but he was enabled by the government of Inspruck to revive and support them. He was then deputed by the archduke to examine the mines in Hungary and Bohemia; but notwithstanding this high patronage, he involved himself in debt, and by his pride and extravagance forfeited the favour of his patrons. In 1569 he obtained leave to visit Lower Germany, for the purpose of making some observations in natural history, and of superintending the printing of some of his works. During the leisure afforded by some of his sea-voyages, he had composed, in German verse, a work intitled "Archidoxia," or an account of the influence which the planets have on the human body, and on all the employments of man; together with a secret introduction to alchemy. He had prepared also another work, called the "Quintessence," in which he pointed out the connection between medicine and alchemy, and gave instructions how to extract from all substances their quintessence or subtile parts. He pretended also to have made some other curious discoveries, which we cannot detail. At Munster he published, in 1569, the first edition of his "Archidoxia," in 4to.; and his "Quintessence" was printed there, also in 4to., in 1570. These works were afterwards enlarged and published in folio. Thurneisser, quarrelling with the bishop, left Munster and removed to Frankfort on the Oder, to print his "Pison," or Description of Rivers, by which, together with his calendar and book on plants, he acquired the greatest share of his reputation. Having cured the margravine of Brandenburg of a dangerous illness, the margrave appointed him his physician, and defrayed the expence of bringing his wife and family from Constance. In 1572 he published his work "On Urine," in which he asserts, that by examining the urine of Sigismund I. of Poland, he had discovered the nature of his disease, and predicted his death, with the day on which it would happen. Under the patronage of the margrave of Brandenburg he went on prosperously with his laboratory and printing-press; and indulged in the most expensive and splendid mode of dress and living. His visitors were numerous, and of the first rank; and among his correspondents

were the emperor Maximilian, and Elizabeth queen of England. He was consulted not only in all kinds of diseases, but on witchcraft, magic, and other such matters. His printing-press was in high estimation. By printing, and the sale of his MSS. and prescriptions, he acquired great wealth. For the MSS. the elector, John Gruge, gave him 9000 dollars; and there was formerly in the king's library at Berlin, a MS. entitled "De Transmutatione Veneris in Solem," for which an annual pension of 600 dollars was settled on him and his children. He was the first person who formed a collection of natural curiosities in the Marche of Brandenburg. He had also a garden filled with plants for the study of botany, and a menagerie, containing a collection of various animals from all parts of the world. In 1575 he lost his second wife, who arranged all his affairs with great prudence; and this was the era of his downfall. From opulence he was reduced to poverty. His reputation as a physician declined. Dr. Hoffman of Francfort, in his oration "De Barbarie Imminente," was formidable to his credit, and he contrived means to prevent its being printed till the year 1578. Thurneisser, fearing utterly to lose his character, prepared for his departure from Berlin, and retired to Basle, where, in 1580, he married a third wife. Withdrawing from domestic disquiet into Italy, he is said to have converted, in the presence of the grand duke, Francesco de Medici, one half of an iron nail into gold. This singular man died in 1595, or 1596, in a monastery at Cologne, after requesting that his body might be interred close to that of Albert the Great. A list of his works is given by Haller in his *Bibliotheca. Gen. Biog.*

**THUROTZ**, in *Geography*, a river of Hungary, which runs into the Waag, 12 miles N. of St. Martin. It gives name to a county.

**THURROCK GRAYS**, or **GREAT THURROCK**, a market-town in the hundred of Chafford, and county of Essex, England; is situated 22 miles S.S.W. from Chelmsford, and 24 miles E. by S. from London. It acquired the appellation of Grays from the noble family of that name, who possessed the manor for upwards of three centuries, from the year 1194, when it was granted to them by king Richard I. The town consists principally of one irregular street, on the banks of a small creek from the Thames, navigable for hoys and vessels of small burthen. A weekly market is held on Thursdays, chiefly for the sale of corn, and is much frequented: here is also an annual fair. The church is built in the form of a cross, with a tower on the north side. By the return under the population act of the year 1811, this parish was stated to contain 214 houses, and 1055 inhabitants.

In the adjacent parishes of Chadwell and Little Thurrock are various caverns, or holes, of unequal depths and dimensions, formed in the chalk, which here constitutes the upper stratum: they appear to open from the top by a narrow circular passage, which near the bottom begins to spread, and communicates with subterranean apartments of different forms. Dr. Derham measured six of these caverns, and reports them to be of various depths, from fifty to eighty feet. The origin of these excavations is uncertain; the opinion of some modern writers, that they were the granaries of the Britons, seems by far the most rational supposition. They are also called Danic Holes, and traditionally reported to have been used as receptacles or hiding-places for plunder during the frequent incursions of the Danes into this island.—*Beauties of England and Wales*, vol. v. Essex; by J. Britton and E. W. Brayley.

**THURSDAY**, the fifth day of the Christians' week, but the sixth of that of the Jews. See **THOR** and **WEEK**.

THURSDAY,

THURSDAY, *Holy*. See HOLY.

THURSDAY, *Maunday*. See MAUNDAY *Thursday*.

THURSIO, in *Ichthyology*, a species of fish mentioned by Pliny, lib. ix. cap. 9. It is thought by some to be the *phocena*, or porpoise; and by others the sturgeon.

THURSO, or THORSAN, in *Geography*, a market-town in the shire of Caithness, Scotland, is situated on the northern side of the coast, at the extremity of a spacious bay, on the estuary of the river Thurfo, at the distance of 279 miles N. from Edinburgh. The town is irregularly built. A new town, on a regular plan, has been lately commenced at Thurfo, in consequence of which, the inclosed lands let for five guineas *per acre per annum*. Here is a fine bay or harbour, which is progressively much improved in convenience and security. Eight vessels belong to the town, and are chiefly employed in conveying salmon to London. Although the customs of this port are very inconsiderable, yet the following officers are regularly stationed here; a collector, comptroller, land-surveyor, land-waiter, two established tidesmen, and one extraordinary tidesman. Thurfo is a borough of barony, holding of sir John Sinclair as immediate superior. The charter of erection was granted by Charles I. in 1633, in favour of John Malter, of Berriedale, by which it was entitled "to all the privileges, immunities, and jurisdictions, belonging to a free borough of barony in Scotland." It is governed by two baillies and twelve counsellors, who are appointed by the superior, and hold their offices during his pleasure. A well-supplied market is held on Fridays; and here are two annual fairs, one of which continues for ten days. The principal manufacture of the town is coarse linen cloth: in the neighbourhood are a bleach-field and a tannery, both of which are prosperous. In the population return of the year 1811, the town and parish of Thurfo were estimated to contain 592 houses, inhabited by 3462 persons. The parish extends about three miles from the town in every direction, except to the north-west, where it is bounded by the sea. The rocks that bound the coast exhibit various scenes of natural grandeur. The Clett is an insulated rock about 160 yards long and 80 broad; it is elevated about 400 feet above the surface of the sea; and during the spring season, is frequented by innumerable flocks of sea-fowls.

Thurfo East, anciently called Thurfo Castle, once the residence of the earls of Caithness, is now the seat of sir John Sinclair, bart. a native of Thurfo; a gentleman whose exertions will ever be revered by men of science for "The Statistical Account of Scotland." In the park are the ruins of a small chapel, where earl Harold the younger was buried, and where a neat modern monument has been erected by the above-mentioned baronet.—*Beauties of Scotland*, vol. v. Carlisle's *Topographical Dictionary of Scotland*, vol. ii.

THURSO, a river of Caithness, which runs into the sea, at the town of Thurfo.

THURUS, in *Natural History*, the name of a creature described by Gesner, and some others, as a distinct species of wild bull; but the accounts of it seem either fabulous or mistaken descriptions of the wild bull.

THURY, in *Geography*, a town of France, in the department of the Yonne; 10 miles S.E. of St. Fargeau.—Also, a town of France, in the department of the Oise; 7 miles S.E. of Creffy.

THUS, a town of Persia, in the province of Khorassan; 200 miles N.N.W. of Herat.

THUS, a river of Persia, which rises near Mesghid, in Khorassan, and runs into the Caspian sea, 40 miles N.W. of Zaweh.

THUS. See FRANKINCENSE.

THUS *Judæorum*, called also *casçarilla* and *cortex eleutheria*, in the *Materia Medica*, is the bark probably of the shrub described by Catésby, under the name of *ricinoides cleagni folio* or *ilathera*, the *croton casçarilla* of Linnæus, which grows plentifully in most of the Bahama islands; thence it is brought to us in curled pieces, or rolled up into short quills, about an inch wide; covered on the outside with a rough whitish matter; and brownish within; and exhibiting, when broken, a smooth close blackish-brown surface. The bark, freed from the outer coat, has a light agreeable smell, and a moderately bitter taste, accompanied with a considerable aromatic warmth. It is easily inflammable, and yields, whilst burning, a fragrant smell, somewhat resembling that of musk. Stiffer was the first who employed this bark as a medicine in Europe; who relates that a tincture of it in alkalized vinous spirits, or in dulcified alkaline spirits, proved carminative and diuretic, and did service in arthritic and scorbutic cases. In 1694 and 1695, it was employed by Apinus in an epidemic fever of the intermitting kind. The gentlemen of the French Academy found this bark of excellent service against an epidemic dysentery in 1719, when the ipecacuanha proved ineffectual. At present it is of great esteem among the Germans, as a warm stomachic and corroborant, in flatulent colics, internal hæmorrhages, dysenteries, the diarrhœa of acute fevers, and, mixed with the Peruvian bark, in common intermittents.—Among us it has been lately received into practice; but its use, says Dr. Lewis, is not yet become so general as it well deserves to be. Its virtues are partially extracted by water, and totally by rectified spirits. Lewis's *Mat. Med.*

THUS, in *Sea Language*, the order by which the pilot directs the helmsman to keep the ship in her present situation when sailing with a scant wind, so that she may not approach too near the direction of the wind, and thereby shiver her sails, nor fall to leeward, and run farther out of her course. Falconer. See STEERING.

THUSCUS VICUS, in *Ancient Geography*, the name of one of the seven mountains of Rome, called also Cælius Mons.

THUTHOA, a river of the Peloponnesus, in Arcadia, which discharges itself into the Ladon.

THUYA, in *Botany*. See THUJA.

THWAITE, in *Ichthyology*. See SHAD.

THWART, in a boat, the seat or bench of a boat on which the rowers sit to manage the oars. Hence *thoughts*, (which see,) is used in the same sense.

THWART *the Hawse*, in *Sea Language*. See ATHWART.

THWART *Ships*, across the ships. See ATHWART.

THWART *the Way*, in *Geography*, a small island in the Straits of Sunda. S. lat. 5° 55'. E. long. 105° 43'.—Also, a small island in a bay on the coast of New Guinea. S. lat. 2° 15'. E. long. 136° 54'.

THWARTER, TREMBLING, or *Leaping-Ill*, a disease in sheep, of the shaking, jumping, and convulsive kind. These different terms, some of which were formerly particularly used in one part and another in another, especially in the northern districts of the kingdom, are now said to be had recourse to indifferently, and applied indiscriminately to all diseases which, on a dry soil, proceed from a weak and enfeebled state of body and barren seasons. Under this threefold name, some say they have seen sheep suffering by diseases, which at least had much resemblance to those of several other sorts, as the apoplectic, paralytic, rheumatic, &c.; and that even when an old sheep falls down, and dies of weakness and exhaustion, the manner of its death differing somewhat from that of the hog-sheep, it is frequently ascribed by shepherds to the thwarter or trembling-ill.

There is, on the whole, so much contrariety of opinion, and diversity in the descriptions of the disease, its causes, and the means of cure, that the writer of a paper on some of the diseases of sheep, in the third volume of the "Transactions of the Highland Society of Scotland," has divided and considered it under two distinct species.

The *first* variety, it is said, is much more rare than formerly, and is scarcely known in the Highlands of the above country. It appears mostly in the spring and harvest seasons. It affects sheep of all ages and kinds, but never when in good condition, existing chiefly on dry farms, which have a northern exposure, and which are evidently overstocked; but on these only when the spring is severe and dry, or when early April grass has been cut down by frosts, and the sheep can find no succulent food or any thing green. Its production is favoured by a long continuance of easterly winds; and in cold weather, ewes are sometimes attacked by it, even after they are weaned. In these circumstances they become extremely emaciated, especially when heavy with lamb in many of them, or giving suck; and when at this time they get an overstretch in running or leaping, or even an hasty start, or crush in the fold, numbers fall a prey to this disorder.

The appearances are, that some sheep, it is said, will fall down and die in two or three minutes; others will lose the power of one side, and lie sprawling until they die of hunger; others again will lie shivering, and very sick at times, until death also comes on; and some will go a long time quite lame, until they are likewise quite exhausted. Others describe it as of two kinds; in one, sometimes seizing the whole system, when there is a general trembling over the whole body, and in the other, sometimes affecting the legs only, when the animal immediately falls down, and the shaking, which is uninterrupted, is confined to the legs. Some say that the animal gradually loses the power of its legs and body, until it becomes quite weak, always lying at last upon one side. Those sheep which die of it in spring, are lean and useless; but the mutton of fat hog-sheep carried off by it in the autumn is not uneatable. It is sometimes extremely fatal. In one instance, out of a flock of forty score, seventeen score were, it is stated, lost in one spring. It was formerly thought to be contagious, and although this can scarcely be the case, it is certainly most destructive when it first comes among a flock; and when sheep are brought from a clean ground to one infected with it, great numbers of them are sure of dying. Those which survive it one season, are sure to relapse the next spring.

Udder-locking should be entirely laid aside, as in one instance, one-twentieth of a large parcel of ewes is said to have died of the disease, in the course of a week after they had been udder-locked. See *UDDER-LOCKING*.

It is also said to be useful during the early spring months to provide them with sufficient food and shelter; and to avoid overstocking, if the early grass has been blighted, to pasture them in a rich park or other ground, on water-meadow, or on moss and early rye-grass.

The *second* variety of the disease is, it is remarked, chiefly confined, in the above part of the kingdom, to the flocks in the south of it, more especially about the banks of the river Tweed, and of those which discharge themselves into it. It is said to be a complaint almost unknown to the farmers on the Pentland range, and to the north of the Forth. In those places where it prevails, it is sometimes peculiarly fatal, and a farmer often loses more of the flock by it alone, than all the other diseases put together.

The appearances when it first comes on, which is generally during the summer or harvest months, are, that the

animal turns somewhat stupid and neglects its food, dozes round, in some measure, as in the sturdy, and frequently leaps up, as if to clear any bush or dike before it; at times, it will eat voraciously, and again refuse all sustenance for a considerable time. It continues frequently leaping during the day, and the neck is often stiff, and turned on one side; convulsions take place in the limbs which cause the animal to fall down, make curious contortions, and at times run to a little distance; the body sometimes partakes of these, when the sheep becomes totally incapable of motion, and dies from want of food, which the jaws will not open to admit, being closely wedged together. In this state, it is unable to follow the flock, and the wool claps to the body. It lies for a long time motionless, and at length dies. After lying motionless for a considerable time, in those cases where the disease is not so violent, and the spasm of the jaw not so severe, it gradually relaxes, and the sheep will eat the whole of the food within reach quite bare, although the power of the limbs is totally gone, leaving the earth quite red and naked all round them. If the shepherd be attentive, and lifts them from place to place, and the season be pretty well advanced, they often slowly recover, and are again restored to the use of their limbs. When they lie in this inactive state, if the weather be warm, maggots are very apt to breed in them; and if not attended to, soon destroy them.

The disease mostly appears at the periods stated above, especially during hot and sultry weather, and arises either from the sheep being put into violent motion by dogs, or overheated by the sun; in which cases, in a few hours afterwards, it makes its appearance by the stiff neck, or some of the other signs coming on. When the sheep are exposed to fatigue, it will take place, if the weather be warm, independent of violent motion. They are commonly the *fattest* of the flock that are cut off by it. It not unfrequently arises from the braxy, of which it is mostly a favourable sign. It is never severe, however, when it is the consequence of that disease, and the stiff neck never accompanies it.

In regard to the means of cure in the *first* sort, they are various. When the sheep fall down suddenly, and are threatened with immediate death, bleeding, by cutting the tail, or opening a vein on the inside of the fore-thigh, will sometimes give instantaneous relief. In all the other cases it is proper to take them home and feed them with strengthening food; and if at this time they be attacked with a temporary scouring, they mostly recover very fast, and soon acquire their former vigour. It is said that some few means of cure are occasionally tried, but it is believed with little success. Dipping in cold water is not infrequently practised: whisky and gunpowder are sometimes poured down their throats; and balls of mustard and other hot pungent medicines are often administered. Others recommend bringing them into the house, giving them a mixture of equal quantities of fallad oil and spirits, with a little finely powdered ginger, and at the same time rubbing into the back a little black soap broken in warm water, and feeding them on hay, the produce of dry walks or other grounds.

The giving of the sheep a decoction of the dewcup and healing leaf boiled in butter-milk, is said to have been uniformly successful in treating sheep affected with this disorder during the summer and autumn.

In the removal of the *second* kind of the disease, as it arises from the brain being oppressed, by too much blood being sent to it by the quickened circulation, the first thing to be attended to on its appearance is copious blood-letting,

which will be more effectual if taken from the veins of the neck, or from a vein on the outside of the eye, mostly well known to shepherds. It may even be taken from the tail, or fore-leg; but opening of the veins of the head is generally considered as the most proper and beneficial in this species of the complaint. As there is too great a determination of blood to the head, it will be attended with advantage to make a determination to the bowels, by stimulating them by means of purgatives, such as those of common salts, one ounce or more; calomel, from ten grains to half a drachm; or, what is supposed more proper, as it also acts upon the kidneys and skin, a dose of half an ounce or more of nitre. These remedies are to be persevered in, until all marks of the disease disappear. But if the sheep be too far gone in the disorder, and has lost all motion, it should be killed for the sake of the carcase, which in this species of the disease is not affected, or at least but very slightly.

In the managing of the cure, much nice attention is necessary in both kinds of this disease.

THY, in *Geography*, a town of Prussia, in Pomerelia; 7 miles N. of Marienburg.

THYAMIA, in *Ancient Geography*, a town of the Peloponnesus, in Sicyonia. Xenophon.

THYAMIS, a town of Arachosia, founded by Semiramis.—Also, a promontory of Epirus, between Thesprotia and Cestrinia.

THYARIS, a river of Asia, in Phrygia Salutaris, which passed through the northern part of this province, and discharged itself into the Sangara.

THYATIRA, AKHISAR, a town of Asia Minor, in Lydia. According to Steph. Byz. it was very ancient, and called Pelope, Pelopea, or Pelopia, and afterwards Semiramis. According to Pliny it was also denominated Evippa. It derived its name of Thyatira, from the Greek word signifying daughter, from Seleucus Nicanor, who received the news, as it is said, at this town of the birth of a daughter. From an inscription found in this city, it appears that Adrian had a temple in it; and medals have been found here that were struck in honour of Adrian. Strabo says that the town of Thyatira was considered by some authors as the last of the district of Mysia, and that it was a colony of Macedonians. After Scipio had defeated Antiochus near Magnesia of Sipyla, the town of Thyatira sent ambassadors to the Romans, to render them homage. Thyatira was taken by Aristonicus, in the year 130 B.C.; but this prince having been taken prisoner in the same year by the consul Perpenna, this town reverted to the dominion of the Romans. Thyatira was much distinguished by the benefactions of the emperor Caracalla; and it appears by a medal of this town, that under the reign of this prince it took the name of Neocorus. This place was one of the seven churches of Asia, mentioned in the book of Revelations; so that the Christian religion was introduced here by the apostles and their immediate disciples; but whether the church was founded by St. Paul or St. John, or by either of them, does not appear.

The inhabitants of Thyatira had a particular veneration for Diana. This appears from many inscriptions found in the town, on one of which this goddess bears the title of "Diana Montana." The town was situated at the southern foot of a chain of mountains, on the route from Pergamus to Sardis, and it was watered by a stream of the river Caicus. The town suffered much by an earthquake in the reign of Tiberius. See AKHISAR.

THYIA, Θυια, in *Antiquity*, a festival in honour of Bacchus, celebrated by the Eleans.

THYITES LAPIS, in the *Materia Medica of the Ancients*, the name of an indurated clay, approaching to the

nature of a stone. It was found in Egypt, and used in different temperatures of the eyes.

This substance has been very much misunderstood by late writers, and by most of them supposed to be lost at this time; but this was wholly owing to their mistaking the class of bodies among which they were to look for it: some imagining it to have been a species of green marble; and others the turquoise-stone, that Dioscorides meant by this name. It is very plain, however, that it was no other than an indurated clay of the morochthus kind, and no more a stone than that substance, that being also frequently called *lapis morochthus*.

It is of a smooth, even, and regular texture, very heavy, of a shining surface, and of a pale green, without the admixture of any other colour. It does not at all adhere to the tongue, nor stain the fingers in handling; but drawn along a rough surface, leaves a slender white line. It melts slowly in the mouth, and is of a sharp, acrid, and disagreeable taste; and when rubbed down with water on a marble, it melts into a milky liquor of a pure white, not the least greenness being sensible in it. It is found at present in the great mine at Gosselar in Saxony, and seems to owe its colour to particles of copper, to which also it owes the virtues attributed to it by Dioscorides, acting as a weak kind of verdigris. Hill.

THYLACION, a word used by the ancient medical writers, to express the bag formed by the membranes of the fœtus at the orifice of the pudenda, before the birth.

THYLLA, Θυλλα, in *Antiquity*, a festival in honour of Venus.

THYMALLUS, in *Ichthyology*. See GRAYLING, and SALMO *Thymallus*.

THYMATERIUM, in *Ancient Geography*, a town of Africa, in Libya, two days' journey beyond the columns of Hercules, according to the Periplus of Hannon: it is the Thymateria of Steph. Byz.

THYMBRA, a town of Asia Minor, in the Troade, according to Steph. Byz. who says that it was founded by Dardanus, who gave it its name after that of his friend Thymbros. Apollo had a temple here under the appellation of Thymbrian. Strabo says that a stream called Thymbrius traversed its canton, and that this stream discharged itself into the Scamander, before the temple of Apollo. Servius says that Achilles was wounded here by Paris; and this circumstance gave occasion to the report that the wound was inflicted by Apollo.

THYMBRA, or *Tymbra*, a mountain of Asia, in Phrygia.

THYMBRA, in *Botany*, a name borrowed from Dioscorides, whose real θυμβρα, however, is a species of SATUREIA; see that article, n. 3. Linnæus therefore has adopted the above name for another Greek genus, nearly akin to the original plant.—Linn. Gen. 288. Schreb. 385. Willd. Sp. Pl. v. 3. 46. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 375. Sm. Prod. Fl. Græc. Sibth. v. 1. 398. Juss. 115. Lamarck Illustr. t. 512.—Class and order, *Dynamia Gymnospermia*. Nat. Ord. *Verticillata*, Linn. *Labiata*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, nearly cylindrical, with a longitudinal hairy keel at each side, the orifice two-lipped; upper lip broadest, cut half way down into three equal converging segments; lower in two deep narrower segments. *Cor.* of one petal, ringent; tube nearly cylindrical; upper lip flat, erect, cloven, obtuse; lower in three, nearly equal, flat lobes. *Stam.* Filaments four, thread-shaped, approaching each other in pairs, two of them shorter than the rest; anthers of two divaricated lobes, under the upper lip of the corolla. *Pistl.* Germen superior, four-cleft;

cleft; style thread-shaped, cloven a little way down; stigmas two, acute. *Peric.* none, except the unaltered calyx. *Seeds* four.

*Eff. Ch.* Calyx nearly cylindrical, two-lipped, marked on each side with a hairy prominent line. Style cloven.

1. *Th. spicata*. Spike-flowered Thymbra. Linn. Sp. Pl. 795. Willd. n. 1. Ait. n. 1. Sm. Fl. Græc. Sibth. t. 546, unpublished. (*Th. spicata* verior hispanica; Barrel. Ic. t. 1230. *Thymum majus longifolium*, &c.; Pluk. Phyt. t. 116. f. 5.)—Flowers spiked. Leaves lanceolate.—Native of the Levant, on dry hills. Dr. Sibthorp met with the plant in Crete, Asia Minor, and Greece, and conceived it to be the *ὑσσωπος ὀρεινός*, or Mountain Hyssop, of Dioscorides, which is extremely probable. The *stem* is shrubby, very bushy, about a foot high, with numerous, upright, simple, leafy, purplish, quadrangular branches, whose opposite sides are often densely downy, in an alternate manner between the different pairs of leaves, the pubescence recurved. *Leaves* opposite, sessile, crowded, spreading, acute, entire, about an inch long, smooth on each side, besprinkled with resinous dots, and fringed at the margin with copious white hairs. They are accompanied by axillary tufts of smaller and narrower leaves. *Flowers* of a fine reddish purple, in solitary, terminal, dense, leafy, whorled *spikes*, from two to four inches long. *Calyx* reddish, abounding in essential oil, smooth and naked, without ribs, except the lateral line at each side, which is fringed, as well as the teeth, with strong white hairs. *Braçteas* lanceolate, fringed, purplish. Tube of the *corolla* twice the length of the calyx, somewhat downy; lower lip deflexed, in three obtuse equal segments, hairy about the throat. The whole herb has the warm pungent flavour of Thyme, and the aspect of Hyssop.

2. *Th. verticillata*. Whorl-flowered Thymbra. Linn. Sp. Pl. 796. Willd. n. 2. Ait. n. 2. (*Hyssopus montana*; Dalech. Hist. 934; not 394, as Willdenow, copying Linnæus's typographical error, has it.)—Flowers whorled. Leaves linear-lanceolate.—Native of the south of Europe. The *stem* is shrubby, but more slender than the last, hairy in the same manner, but more universally. *Leaves* much narrower, dotted and fringed in the same manner. *Flowers* axillary, from top to bottom of each branch; those of the principal one six in each whorl; those of the lateral branches only two. In structure, size and colour they agree with the foregoing, only the *calyx* has some appearance in the dried specimen of being more ribbed. Its lateral keels, as well as the teeth, are strongly fringed. Nevertheless, the general hue and aspect of these two plants are so much alike, that there seems great reason for Linnæus's suspicion of their being varieties of each other. At the back of the original specimen of this last is the following synonym. *Tragoriganum creticum, majore crassiore asperiori folio*; Prosp. Alpin. Exot. 79. So confused is this old author, that one can hardly tell which of his plates his loose descriptions refer to; but our plant certainly agrees better with his *Thymbra*, t. 80, than with his *Tragoriganum*, t. 78, though the above synonym seems to indicate the latter.

3. *Th. ciliata*. Capitate-flowered Thymbra. Desfont. Atlant. v. 2. 10. t. 122. Willd. n. 3.—Flowers capitate. Leaves linear. *Braçteas* ovate.—Found by Desfontaines, on dry hills and uncultivated spots, near Mascara, in Algiers. A small bushy *shrub*, from eight to twelve inches high, agreeing much in habit with the two preceding species; but the *leaves* are linear; while the *braçteas* are broader and more ovate, as well as the *spikes* much shorter, than in the *Th. spicata*. The *leaves* are equally fringed in all. Nothing is said, or expressed in the figure, of any hairy lateral lines on

the *calyx*, the most important character of *Thymbra*. Having seen no specimen of this species, we cannot judge with certainty respecting its genus, nor whether it might not rather be referred to *Satureia*, see that article; but we cannot satisfactorily assent to the opinion of its learned discoverer, that these genera are not sufficiently distinct. The *calyx* in the natural order to which they belong affords, in many instances, clear, though nice, generic differences. At the same time we admit that Linnæus is incorrect in making a semibifid style, by which must be understood a style cloven half way down, one of the essential marks of a *Thymbra*.

*THYMBRA*, in *Gardening*, furnishes plants of the under shrubby, exotic kind, among which the species cultivated are the spiked thymbra (*T. spicata*); and the whorled thymbra (*T. verticillata*).

*Method of Culture*.—These plants may be increased by seeds, slips, and cuttings. The seeds should be sown in the early spring in a warm border, and sheltered from bad weather by glasses; or, which is better, in pots filled with light mould, and placed in a mild hot-bed: when the plants have attained some growth, they should be set out or removed into separate pots.

The slips and cuttings should be planted out in the spring and summer, and when well rooted, removed where they are to grow: they also sometimes succeed by bottom offsets, planted out as above.

They afford variety among other potted greenhouse plants; and require the protection of such houses during the winter season, in this climate, in almost all situations and places.

*THYMBRÆUS MONS*, in *Ancient Geography*, a mountain of Asia Minor, in the Troade; from which, according to Festus, Apollo was denominated Thymbrian.

*THYMBRIA*, a place of Ionia, four stadia E.S.E. of Myus. The cavern Charonium was near Tymbria, which was thought to be one of the mouths of Hell, because from it issued pestilential vapours.

*THYMBRIUM*, a town of Asia, in Phrygia, at the distance of twelve parasangas from Caystropedium. At this place was a fountain, called the fountain of Midas, king of Phrygia.

*THYME*, in *Botany*. See *THYMUS*.

In the *Materia Medica*, the common garden thyme is a moderately warm pungent aromatic. To water it imparts by infusion its agreeable smell, with a weak taste and yellowish or brown colour; in distillation, it gives over an essential oil, in the quantity of about an ounce from thirty pounds of the herb in flower, of a gold yellow colour if distilled by a gentle fire, of a deep brownish-red if by a strong one, of a penetrating smell like that of the thyme itself, but less grateful, and in taste exceedingly hot and fiery: the remaining decoction, inspissated, leaves a bitterish, roughish, subsaline extract. The active matter, which by water is only partially dissolved, is by rectified spirit dissolved completely, though the tincture discovers less of the smell of thyme than the watery infusion; and the spirit brings over, in distillation, a part of its flavour, leaving an extract of a weak smell, and of a penetrating camphorated pungency. Murray has observed, that this plant seems actually to contain a species of camphor.

The virtues of thyme, according to Bergius, are resolvent, emmenagogue, diuretic, tonic, and stomachic. As agreeing, says Woodville, in common with the natural order of verticillatæ, its aromatic qualities may be found equally useful in some of those complaints for which lavender, sage, rosemary, &c. are usually employed.

The *serpyllum*, or mother of thyme, is an elegant aromatic plant,

plant, similar to the preceding species, but milder, and in flavour rather more grateful; its essential oil is both in smaller quantity and less acrid, and its spirituous extract comes greatly short of the penetrating warmth and pungency of that of the others, so that it is less medicinal than the other species. It is said to afford an agreeable distilled water, more durable, but less active and penetrating than peppermint. (Lewis.) This has been much extolled as a nervous simple. An infusion of it has been said to do wonders in tumours, lowness of spirits, and head-aches: and it has been much commended for the cure of the night-mare.

The *lemon-thyme*, which is a variety of the last, is less pungent than the first sort, but more so than the second, and much more grateful than either. Distilled with water, it yields a larger quantity than the other sorts, of a yellowish very fragrant oil of the lemon-flavour, containing nearly all the medicinal parts of the plant. It gives over also, with rectified spirit, its finer odorous matter. Lewis.

THYME, *Cat.* See *TEUCRIUM Marum*.

THYME, *Mastich.* See *THYMUS Mastichina*.

THYMELÆA, in *Botany*, from *θυμος*, *thymos*, and *ελαια*, *an olive*, (the first alluding to the leaf, and the latter to the shape and oiliness of the fruit,) is an ancient Greek name, found in Dioscorides, book 4. chap. 173. His *θυμιδαία*, there described, is thought to be the *Daphne Gnidium* of Linnæus; and must be at least one of that natural order, and, probably, genus. Hence the name has been applied by many botanists, amongst which were the Bauhins and Tournefort, to what Linnæus called DAPHNE; see that article. This latter appellation was preferred by him and his school, because a name composed of another, already established, is contrary to a very sound law of the *Philosophia Botanica*; and in the present instance the word is compounded of two other generic names, though one of them has been made Latin in *Olea*. The French however still hanker after *Thymelea*, as appears by Jussieu's choosing it for the title of one of his Orders. See THYMELÆÆ.

THYMELÆÆ, the twenty-fifth of Jussieu's Natural Orders, or the second of his sixth class, thus named from an ancient synonym of the genus *Daphne*, which makes a principal figure herein. (See DAPHNE and THYMELÆÆ.) This order is analogous to the *Vepreculæ* of Linnæus. For the detailed characters of Jussieu's sixth class, see LAURI. The order of *Thymelææ* is defined as follows.

*Calyx* of one leaf, tubular, inferior. *Corolla* none; but in some instances there are petal-like scales, originating from the mouth of the calyx, which have the appearance of a polypetalous corolla. *Stamens* definite, inserted into the calyx, and for the most part double the number of its segments, some being opposite, others alternate therewith. *Germen* superior, simple; style solitary; stigma mostly undivided. *Seed* solitary, superior, either naked, or pulpy, or clothed with the calyx. *Embryo* destitute of albumen; its radicle superior. *Stem* mostly shrubby. *Leaves* generally alternate.

We may add to these characters of Jussieu the remarkable silky appearance of the inner bark, when a twig is broken. Mr. Brown, *Prodr. Nov. Holl.* v. 1. 358, observes that the general number of *stamens* is eight, sometimes four, rarely but two; in the latter cases always opposite to the segments of the *calyx*, which are occasionally five, sometimes, not always, with ten *stamens*. The same writer informs us there is sometimes a slight portion of *albumen*. The *leaves* are entire, destitute of *stipulas*. *Flowers* capitate or spiked, terminal or axillary, sometimes solitary.

The genera, as they stand in Jussieu, are *Dirca*; *Lagetta*, Lamarek Illustr. t. 289; *Cansjera*, Juss. append. 448;

*Daphne*; *Passerina*; *Stellera*; *Struthiola*; *Lachnea*; *Dais*; *Gnidia*; *Nesandra* of Bergius, included under *Gnidia* by Linnæus; and *Quisqualis*. To these is to be added the great diandrous genus of *Pimelea*, of which Mr. Brown describes thirty-four New Holland species.

The order under consideration is one of those which has most excited the question of what is a *calyx*? and what a *corolla*? and is appealed to equally by those who maintain different theories on this intricate subject. It seems to us that the *Thymelææ* combine both those parts in one, the coloured inside of their *calyx* having exactly the nature of a *corolla*; which is confirmed by the remark of Jussieu, that the tube of *Daphne Mezereum* is double, formed of two layers. The appendages, in the form of scales, or glands, found in *Gnidia* and *Struthiola*, are more evidently *petals*, and would doubtless be universally taken for such, did not analogy and theory cast a doubt over the subject. At any rate it is safe to say that *Daphne* has a coloured *calyx*, as well as most of its allies; just like *Polygonum*, in the generally colourless order of *Holeracea*, or *Atriplices*.

THYMELÆÆ *Radix*, in the *Materia Medica*, the dried root of the *thymelæa foliis lini* of Tournefort and other authors.

It is a light root of different sizes, of a reddish colour without, and greyish within, woody, and full of fibres, and tastes sweet at first, but is hot as fire when it has been held a little time in the mouth. It loses however both this fiery taste, and its acrid quality, in long keeping, and with them its virtues.

It is to be chosen new, well fed, and not worm-eaten. The fruit of this plant is the *granum cridium* of the shops. They are both of an acrid quality, and are not in use in the shops at present.

THYMELE, in *Biography*, a celebrated female Grecian, who invented theatrical dances. It is supposed that the Greeks called their comedians *Thymelici* from her name.

THYMELE, in the *Ancient Theatre*, a kind of pulpit, where the singers, called *thymelici*, performed.

THYMELICI, among the Romans, were musicians, who sung in the interludes, or who danced and kept time with their gestures. The place where they performed was called *thymele*, whence Juvenal, vi. 66.

“Attendit thymele, thymele nunc rustica discat.”

THYMIAMA, *θυμιαμα*, in *Antiquity*, an offering of incense to God.

THYMIAMA, in the *Materia Medica*, a name by which some authors have called the *castarilla bark*; called by some *cortex thuris*, or Indian bark. (See *Titus Judæorum*.) The *cortex thymiamatis* of the German shops is a bark, in small brownish-grey pieces, intermixed with bits of leaves, brought from Syria, Cilicia, &c. and supposed to be the produce of the liquid storax-tree. It has an agreeable balsamic smell, approaching to that of liquid storax, and a subacid bitterish taste accompanied with some slight astringency. Cartheuser and Hoffman report, that it affords an excellent fumigation for œdemas, rheumatisms, and catarrhs; and that the spirituous tincture and extract, and the distilled spirit, are useful anodynes or antispasmodics in convulsive coughs and other disorders. It is rarely met with in this country. Lewis.

THYMIAMATA, a kind of fumigations among the ancients, the ingredients of which were so various, that it appears they always consulted utility as well as pleasure, in their composition of them.

We find the gum ammoniacum of the ancients, which had the smell of castor, used in them: whence it is evident, that

that the ancients used saliferous as well as sweet-scented things in these fumigations. Galbannum has a worse smell than ammoniacum, and yet this also we find, together with the myrrh, and other gums, is made an ingredient in the oldest prescriptions of this kind.—And Pliny mentions the ammoniacum with the schannanth, and other sweets, used for this purpose.

**THYMIATUM**, in *Ancient Geography*, a country of Africa, in Libya, on the coast of the Atlantic, according to the Periplus of Hannon.

**THYMIC**, in *Anatomy*, arteries, veins, &c. belonging to the *thymus*; see that article.

**THYMIUM**, a wart or excrescence on the skin.

**THYMNIA**, in *Ancient Geography*, a gulf placed by Pliny on the coast of the Doride, a province of Asia Minor. Here was a promontory of the same name.

**THYMOXALMÉ**, in the *Materia Medica of the Ancients*, was a composition used externally in the gout, and many disorders of the limbs, and was given inwardly in distemperatures of the stomach, a quarter of a pint for a dose. It operated as a purge, and was prepared in the following manner: take two ounces of bruised thyme, as much salt, a little meal, rue, and pennyroyal.—These were to be put into a pot, and three pints of water and fourteen ounces of vinegar are to be poured upon them; after which they are to be covered with a coarse cloth, and set in the sun for some time. Dioscorides, lib. v. cap. 24.

**THYMUS**, in *Anatomy*, a glandular body, occupying the upper and anterior part of the chest, and neighbouring portion of the neck, very large in the fœtus, and diminished or nearly disappearing in the adult. The name is Greek, *θυμος*, which Pollux defines “*caro similis tonsillæ, prope cordis caput*,” p. 258. The gland consists of two lobes, a right and left, which are elongated and conical, being broader below and narrow above: they are joined by cellular substance, which can easily be destroyed by dissection, in their inferior two-thirds, but above they are separated by the intervention of the trachea. The thymus, indeed, may be described as forming two elongated horns above, of which the right is sometimes longer than the left: it also forms two horns below; but they are shorter, thicker, and more obtuse. The principal body of the gland occupies the cavity of the mediastinum, or the interval between the right and left pleuræ, behind the upper part of the sternum. Here it is covered in front by that bone, on the sides by the pleuræ, and it rests behind on the front of the pericardium, of the aorta at its origin, and of the left subclavian vein. The inferior cornua reach to about the middle of the pericardium; and sometimes nearly to the diaphragm: the superior run into the neck, on each side of the trachea, between that tube and the carotid, and reach the thyroid gland, or nearly so.

The thymus is large in the fœtus; nearly equal to the heart or one of the lungs. In a fœtus of six months, this gland was to the kidney as 4 to 6. It not only does not increase after birth, but it becomes less, contains less fluid, is harder, and is nearly lost in the surrounding fat. In the mature fetus it weighed 160 and 180 grains; at twenty-eight years, 90 grains. In a calf it was 16 ounces; in a full-grown cow, 9 ounces.

In structure it resembles the conglomerate glands: that is, it is composed of innumerable small portions, united by cellular substance. By maceration these may be separated into smaller and smaller lobules. It is however softer than the pancreas or salivary glands, and of a darker colour. When cut into, a copious whitish fluid may be squeezed out from all parts of its texture. If air be impelled into it, the whole is reduced into a spongy kind of substance.

No excretory duct has been discovered in the thymus; although anatomists have fancied that they had discovered passages from it to the œsophagus, trachea, pericardium, &c.

It has several arteries and veins: the former principally from the thyroid and mammary. The veins join the left subclavian, or the jugular, and the internal mammary.

The nerves, if it has any, are extremely small twigs from the plexus. Its absorbing vessels, which no doubt exist, are not much known.

It is of considerable size, even in the adult, in some animals, as the rat: the same may be observed of the Arctic bear. It is large in setaceous animals.

We know nothing of its office, nor why it is so large in the fœtus. There is not even a probable conjecture on the subject.

**THYMUS**, a warty excrescence, especially about the anus or pudenda.

**THYMUS**, in *Botany*, *Thyme*; *θύμος* of the Greeks, whether so called from *θυμός*, *courage*, in allusion to its cordial qualities; or from *θυω*, *to glow or burn*; or *to sacrifice*, because it may have been used in sacrificial garlands; we must leave to every one's opinion. The last explanation appears the least satisfactory.—Linn. Gen. 297. Schreb. 394. Willd. Sp. Pl. v. 3. 138. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 413. Sm. Fl. Brit. 639. Prodr. Fl. Græc. Sibth. v. 1. 419. Pursh 413. Juss. 115. Tourn. t. 93. Lamarck Illustr. t. 512.—Class and order, *Didynamia Gymnospermia*. Nat. Ord. *Verticillata*, Linn. *Labiata*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, permanent, divided nearly half way down into two lips, the mouth closed with converging hairs; upper lip broadest, flat, erect, with three teeth; lower of two equal awl-shaped segments. *Cor.* of one petal, ringent: tube the length of the calyx, with a small throat; upper lip rather the shortest, flat, erect, emarginate, obtuse; lower longer and broader, spreading, in three obtuse lobes, of which the middle one is the broadest. *Stam.* Filaments four, incurved, two longer than the rest; anthers small, two-lobed. *Pist.* Germen superior, deeply four-cleft; style thread-shaped; stigma divided, acute. *Peric.* none, the seeds being concealed in the calyx, whose orifice is contracted and hairy. *Seeds* four, small, roundish.

Ess. Ch. Calyx two-lipped, its mouth closed with hair. Upper lip of the corolla flat, emarginate.

The trifling genera of old authors, made out of the present, though indicated by Linnæus, are not worth considering. It is more desirable to define the limits of *Thymus* itself, which run very close upon those of *MELISSA*; see that article, at the end of which this subject is discussed. The number of species in Syst. Veg. ed. 14. are eleven; Willdenow has 22. We shall find some things among them to correct, and several new species to add. The habit of the whole is more or less shrubby, but their stature humble, with spreading or diffuse branches. *Root* woody, generally perennial. *Branches* square. *Leaves* opposite, mostly entire. *Flowers* either whorled or capitate, purple or lilac, sometimes nearly white; never really blue, scarlet or yellow. Whole plant abounding with pungent aromatic essential oil. This genus is almost entirely European, and inhabits dry hilly situations, in the warmer or more temperate climes.

1. *Th. Serpyllum*. Wild Thyme, or Mother of Thyme. Linn. Sp. Pl. 825. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1514. Curt. Lond. fasc. 2. t. 47. Woodv. Med. Bot. t. 110. (*Serpyllum*; Rivin. Monop. Irr. t. 42. *S. vulgare*; Ger. Em. 570. Dod. Pempt. 277. Vaill. Paris. t. 32. f. 9, as well as the varieties 6, 7 and 8.)

## THYMUS.

β. *Serpyllum citratum*; Ger. Em. 571. Rivin. Monop. Irr. t. 41. Lemon Thyme.

γ. *Thymus lanuginosus*; Willd. n. 2. (*Th. Serpyllum* δ; Linn. Sp. Pl. 825. *Th. pannonicus*; Allion. Pedem. v. 1. 20. *Th. n. 236*. Hall. Hist. v. 1. 103. *Serpyllum montanum* hirsutum; Rivin. Monop. Irr. t. 42.) Hoary Mother of Thyme.

Flowers capitate. Stems decumbent, creeping. Leaves flat, ovate, obtuse; fringed at the base.—Native of dry heaths and hillocks, as well as alpine pastures, throughout Europe, from Sweden to Greece, flowering all summer long. Its entangled branches form an elastic perennial turf, exhaling a warm aromatic odour when trodden upon, which varies in degree, and, in the well-known variety β, assumes the grateful flavour of lemon-peel. The hoary or woolly variety we believe to be no more specifically distinct, notwithstanding Willdenow's remark, of its being unchanged by culture; for he does not mention having raised it from seed. The stems of *Th. Serpyllum* are wiry and slender, always wavy, never straight; their branches leafy and downy, ascending, each terminating in a little round head of numerous purple flowers, whose palate is variegated with white and crimson. Leaves dotted, strongly fringed at the base, as are their footstalks throughout. *Stipulas* none. Bees frequent the flowers in great numbers. Hairy swellings, caused by an insect, are common on the young shoots. The seeds are rarely perfected.

2. *Th. levigatus*. Smooth Arabian Thyme. Vahl. Symb. v. 2. 65. Willd. n. 3. (*Th. Serpyllum*; Forsk. Ægypt.-Arab. 107.)—"Flowers capitate. Stems procumbent. Leaves linear, obtuse, sessile; contracted at the base."—Found by Forskall, on mount Chadra, in Arabia Felix. Stems shrubby, thread-shaped; smooth in the lower part, villous above, grey, with jointed annulated branches. Leaves half as long as the nail, very smooth, without ribs, dotted on both sides; fringed at the base. Head of flowers sessile, terminal, hemispherical, surrounded with numerous larger leaves. Calyx marked with elevated hairy lines; its teeth awl-shaped, fringed. Corolla rather hairy. Vahl.

3. *Th. montana*. Smooth Mountain Thyme. Waldst. et Kitaib. Hungar. v. 1. 72. t. 71. Willd. n. 13, excluding the rest of the synonyms, which belong to our *Th. Serpyllum*, var. γ. Ait. n. 7.—Flowers in elongated heads. Stem erect, branched. Leaves ovate, obtuse, flat, smooth and naked, entire.—Native of the Carpathian mountains. We received it from the Cambridge garden, in 1803. The root is perennial, with many long branching fibres. Stem a span high, bushy; the angles downy, with fine recurved hairs. Leaves stalked, broadly ovate, slightly revolute; very smooth and even above; destitute of fringe at the base. Inflorescence like *Th. Serpyllum*, but rather more elongated, or spiked, and the flowers smaller, with a much less hairy, though not smooth, calyx, the hairs of whose orifice are scarcely prominent at all, by no means so conspicuous as in the *Serpyllum*.

4. *Th. nummularius*. Money-wort Thyme. Marfch. a Bieberl. Taur. v. 2. 58.—Flowers capitate. Stems decumbent, creeping, hairy. Leaves roundish-ovate, flat, obtuse; somewhat fringed at the base and midrib.—Native of mount Caucasus. We received wild specimens from Dr. Fischer. This has a very different aspect from *Th. Serpyllum*, on account of its almost orbicular leaves, and the hemispherical leafy heads of flowers. Every part moreover is three or four times the size of that common species. The joints of the stem are remarkably villous in their upper part, especially near the flowers. Sometimes, it is said, the whole plant is densely hairy.

5. *Th. Marschallianus*. Bushy Taurian Thyme. Willd.

n. 8. Marfch. a Bieberl. Taur. v. 2. 59.—Flowers in elongated heads. Stem shrubby; its flowering branches erect. Leaves linear-lanceolate, bluntish, flat, somewhat triple-ribbed; fringed at the base. Frequent in dry grassy hilly places, about mount Caucasus, flowering from May to August. This seems by the description more akin to *Th. Serpyllum* than to *Th. Zygis*, for which latter it was taken by Pallas. The stem is procumbent, sending up numerous simple flowering-branches, six inches high, downy in the upper part. Leaves eight lines long, one and a half broad, on very short stalks. Calyx hairy, striated. It varies with leaves but half as broad.

6. *Th. vulgaris*. Common Garden Thyme. Linn. Sp. Pl. 825. Willd. n. 4. Ait. n. 2. Woodv. Med. Bot. t. 109. (*Thymum durius*; Ger. Em. 573.)—Stem shrubby, much branched, erect. Leaves ovate, revolute. Whorls crowded into leafy spikes.—Found on stony hills in Spain, Portugal, the south of France, Greece, and the Archipelago. Common in gardens, flowering during summer. The stem is bushy, woody and rigid. Leaves a quarter of an inch long, various in breadth, downy, of a greyish hue, numerous, with little axillary tufts of smaller ones. Flowers small, light purple, in hairy heads, or short spikes, with two or three remote whorls beneath. Calyx-teeth strongly fringed. This has usually a warm pungent flavour, like Winter Savory; but there is a sweet-scented variety, called Frankincense-Thyme, differing in no other respect from the common sort, which is commonly cultivated in Norfolk, and highly grateful to most people. The θυμὸς of Dioscorides is not, as Bauhin supposed, this plant, but *Satureja capitata*.

7. *Th. lanceolatus*. Lanceolate Thyme. Desfont. Atlant. v. 2. 30. t. 128. Willd. n. 5. Prodr. Fl. Græc. n. 1396.—Stem shrubby, erect. Leaves elliptic-lanceolate, obtuse, entire, downy, flat. Whorls crowded into a dense spike.—Found by professor Desfontaines, flowering in the early spring, on mount Atlas, and by professor Sibthorp in hilly places in Greece. Root creeping, woody. Stems numerous, simple or branched, about six inches high, downy. Leaves near an inch long, and one-third as broad, rather crowded; veiny and dotted beneath. Spikes two inches long, interspersed with lanceolate bracteas. Calyx downy. Corolla purple, glandular, about the size of the last.

8. *Th. numidicus*. Numidian Thyme. Desfont. Atlant. v. 2. 29. Willd. n. 6.—"Stem somewhat shrubby, erect. Leaves linear, spreading, smooth; ribbed beneath. Flowers capitate. Bracteas ovato-lanceolate, fringed. Calyx hairy."—Native of Barbary near La Calle. A little bushy shrub, four inches high, with slender upright branches, downy in the upper part. Leaves entire, with axillary tufts. Flowers in oblong heads. Calyx villous, striated. Corolla small, rose-coloured. Allied to *Th. Zygis*, but the leaves are quite smooth, not fringed; and the bracteas broader at the base. Desfontaines.

9. *Th. Zygis*. White Spanish Thyme. Linn. Sp. Pl. 826. Mant. 413. Willd. n. 7. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 574, unpublished. (*Thymum angusto longioreque folio*; Barrel. Ic. t. 777. *Serpyllum sylvestre*, *Zygis Dioscoridis*; Cluf. Hist. v. 1. 358. *S. creticum*; Ger. Em. 571.)—Stem shrubby, ascending. Leaves linear-lanceolate, obtuse, revolute; tapering and fringed at the base. Whorls crowded into leafy spikes.—Native of Spain and the Levant. Dr. Sibthorp gathered it on hills about Athens and Constantinople. Mr. Malcolm is said in Hort. Kew. to have had the plant in his garden in 1771. Linnæus cultivated it at Upsal. The root is woody and perennial. Stems numerous, from four to six inches long, leafy, round, finely downy,

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downy, reddish, slightly branched, spreading on the ground before flowering, then ascending. *Leaves* three-quarters of an inch long, numerous, crowded, spreading, very minutely and densely downy, copiously dotted; ribbed and rather paler beneath; tapering into a short, broad, downy *footstalk*, coarsely fringed like the base of the leaf itself. *Flowers* in leafy heads, often with an axillary whorl below. *Calyx* clothed with recurved hairs; all its teeth tapering and parallel, strongly fringed. *Corolla* white, with red dots on the palate. *Antlers* reddish, prominent. Professor Sibthorp adopted the opinion of the old authors, that this might perhaps be the *επιπυλλος ζυγις* of Dioscorides. Its appellation in modern Greek is *σαδάρι*, which, if we mistake not, means "the delight of bees."

10. *Th. Acinos*. Basil Thyme. Linn. Sp. Pl. 826. Willd. n. 10. Fl. Brit. n. 2. Engl. Bot. t. 411. Curt. Lond. fasc. 1. t. 43. (*Acinos*; Rivin. Monop. Irr. t. 43. f. 2. *Ocimum sylvestre*; Ger. Em. 675.)—Flowers on simple footstalks, about six in a whorl. Stem herbaceous, ascending, branched. Leaves acute, serrated. Calyx gibbous at the base. Native of dry gravelly or chalky pastures, fallow fields, &c. throughout Europe, nor rare in England, flowering from July to September. The *root* is annual, of a few slender fibres. *Stems* clothed with recurved hairs, reddish, lax and spreading, hardly a span long; their flowery ultimate branches erect. *Leaves* on short footstalks, small, ovate, varying to roundish or oblong, but always acute, more or less deeply and copiously serrated, rarely quite entire, veiny, hairy; the upper ones tapering much at the base. *Flowers* light violet; their palate white, with dark purple spots. *Stamens* short. *Calyx* deeply furrowed, hairy, fringed, swelling underneath, as is the case, more or less, with all the species to which this is allied. The herb is rather slightly aromatic, not pungently so.

11. *Th. suaveolens*. Penny-royal-scented Thyme. Prodr. Fl. Græc. n. 1400. (*Clinopodium minus angustifolium*, *pulegii odore*, *romanum*; Bocc. Mus. v. 1. 50—54. t. 45, A.)—Flowers whorled. Leaves lanceolate-elliptical, pointed, somewhat serrated, hairy. Stems shrubby.—Native of Italy and Greece. The *stem* is a foot high, bushy; the branches leafy, rough, with recurved hairs. *Leaves* with their *stalks* about an inch long, rigid, ribbed, bristly, often quite entire. *Flowers* six or eight in a whorl, on simple stalks. *Calyx* like the last, but longer and more slender. The whole plant smells powerfully of Penny-royal, even after having been dried thirty years. On this subject Bocccone has treated us with a long disquisition, quite in the Italian style, in which the facts are better than the philosophy, though some of those want confirmation. He attributes the above scent to particles of sulphur and bitumen communicated by the soil.

12. *Th. patavinus*. Marjoram-leaved Thyme. Jacq. Obs. fasc. 4. 7. t. 87. Willd. n. 11. Ait. n. 5. (*Clinopodium perenne*, *pulegii odore*, *majoranæ folio*, *patavinum*; Bocc. Mus. v. 1. 60. t. 45, B.)—Flowers whorled. Leaves ovate, with copious shallow serratures, slightly hairy. Stems shrubby.—Native probably of the south of Europe, though no botanist who has described this species seems to have known it but from gardens. Hence even its name originated, which is therefore liable to great exception. Willdenow appears to have seen no specimen. The specific character taken by him from the first edition of Hort. Kew. of "the inflated throat of the *corolla*, extending beyond the *calyx*," is not in the least degree peculiar. Nevertheless, authentic specimens of the plant prove it distinct from the foregoing and the following, in the broad-ovate, almost heart-shaped, figure of the rather fleshy *leaves*, their even surface,

and numerous, minute, shallow serratures. They much resemble some kinds of *Ocimum*, and like those are sometimes concave.

13. *Th. alpinus*. Alpine Thyme. Linn. Sp. Pl. 826. Willd. n. 12. Ait. n. 6. Jacq. Austr. t. 97. (*Clinopodium montanum*; Bauh. Pin. 225. Bocc. Mus. v. 1. t. 45, C. *C. austriacum*; Clus. Pann. 622, 623. Hist. v. 1. 353. Ger. Em. 676.)—Flowers on simple footstalks, about six in a whorl. Stem herbaceous, ascending, branched at the bottom. Leaves ovate or roundish, bluntish, coarsely serrated. Calyx gibbous at the base.—Native of the lofty mountains of Austria, Switzerland, Italy, and Crete, as well as of the Bithynian Olympus. Nothing is more difficult than to define the difference between this and our *Th. Acinos*, except that the *alpinus* is in every part larger and more handsome, with a strong resinous scent. The *root* is either biennial, or perennial, we are not certain which. The *leaves* are too entire in the cut of Clusius and Gerard. 14. *Th. exiguus*. Small Cyprian Thyme. Sm. Prodr. Fl. Græc. Sibth. n. 1402. Fl. Græc. t. 575, unpublished.—Flowers very few in a whorl. Leaves rhomboid, pointed, oblique, nearly entire. Stems branched at the base. Tube of the *corolla* thread-shaped.—Discovered by Dr. Sibthorp in hilly situations in the isle of Cyprus. The *root* is annual, simple, fibrous. *Stem* two or three inches high, erect, with simple leafy hairy *branches* from the bottom. *Leaves* one-third of an inch long, smoothish, on long hairy stalks. *Flowers* either two or four in each whorl, on thick stalks. *Calyx* slender, furrowed, hairy. *Corolla* with a very slender white tube, enclosing the *stamens*, and short, rounded, pale-purple segments in the limb.

15. *Th. pulegioides*. Penny-royal-leaved Thyme. Linn. Sp. Pl. ed. 1. 592. Sm. Prodr. Fl. Græc. Sibth. n. 1397. (*Cunila thymoides*; Linn. Sp. Pl. ed. 2. 31. Willd. Sp. Pl. v. 1. 123. *Acinos thymi folio annuus*, *floribus inexpandis*; Moris. sect. 11. t. 19. f. 6.)—Whorls many-flowered, crowded into long, dense leafy spikes. Leaves ovate, obtuse, entire. Stem herbaceous, branched, with four hairy angles.—Native of the south of France, and of hills in Greece.—*Root* fibrous, marked as annual by Linnæus, but the stems have a shrubby appearance. They are a span high, with opposite branches, leafy, their angles densely clothed with recurved hairs. *Leaves* stalked, from a quarter to half an inch long, deflexed, dotted, smooth, except a few occasional coarse marginal hairs. *Flowers* on longish, cylindrical, densely downy stalks, ten or twelve in each whorl. *Calyx* strongly furrowed, hairy, with a broad upper lip, and two long, narrow, fringed teeth in the lower one; the orifice densely hairy. *Corolla* small; its limb seems to resemble the last-described. Sometimes the *stem* is clothed with whorls of *flowers* almost from the bottom to the top, and the upper *leaves* are larger than the lower. The odour of the plant is that of Thyme, not of Penny-royal.

16. *Th. graveolens*. Strong-scented Greek Thyme. Sm. Prodr. Fl. Græc. Sibth. n. 1403. Fl. Græc. t. 576, unpublished.—Whorls barely six-flowered. Leaves ovate, rhomboid, obtuse, revolute, somewhat serrated. Stems much branched, shrubby.—Gathered on mount Parnassus, by Dr. Sibthorp, who suspected it might be the *επιπυλλος ζυγις* of Dioscorides, and from whose manuscripts we have adopted the specific name. The strong, woody, branching *root* bears a tuft of numerous ascending, branched, leafy, reddish, downy *stems*, about six inches high. *Leaves* dark green, paler beneath, smooth, a quarter of an inch long, on *footstalks* of nearly their own length. *Flowers* on simple stalks, with a pair of small oval *bractææ* at the base of each stalk, usually

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usually three or four in a whorl, sometimes five or six. *Calyx* with a shortish furrowed tube, very gibbous at the base beneath; its upper lip broad; lower of two awl-shaped fringed teeth; both tinged with red. *Corolla* of a purplish crimson, large and handsome, downy in the mouth, as well as at the back, which latter is the case with *Acinos*, *alpinus*, and all of the same tribe.

17. *Th. marginatus*. Thick-edged Thyme. Sm. in Diekf. Dr. Pl. n. 71. (*Th. Piperella*; Allion. Pedem. v. 1. 21. t. 37. f. 3, excluding the synonyms.)—Stalks many-flowered, lateral and terminal. Leaves ovate, nearly smooth, ribbed, entire, with a thick cartilaginous margin. *Calyx*-teeth nearly equal. Stems shrubby, ascending.—On the rocks of the maritime alps of Piedmont very abundantly. *Allioni*. Of more humble stature than the last, with many round, slender, downy, purplish, ascending stems, about a finger's length, branched at the base only. Leaves nearly sessile, inclining to heart-shaped, covered with resinous dots, sometimes slightly downy, remarkable for their thick, smooth, pale margin. *Flower-stalks* chiefly axillary, about as long as the leaves, somewhat corymbose, downy, bearing several small ovate bractes, and three or four flowers. *Calyx* cylindrical, furrowed; all its segments awl-shaped, and not very unequal, none of them fringed. *Corolla* with a slender hairy tube, twice as long as the calyx, and a short rounded limb. The whole plant is warm and pungent, highly aromatic. It is very distinct from the following.

18. *Th. Piperella*. Pepper Thyme. Linn. Syst. Nat. ed. 12. v. 2. 400. Willd. n. 14, excluding the synonym of Allioni, and possibly those of Vahl and Forskall. (*Marum hispanicum nigrum*, flore purpureo, *Piperella hisp*; Barrel. Ic. t. 694. Bocc. Mus. 166. t. 117.)—Stalks many-flowered, lateral. Leaves ovate, somewhat heart-shaped, obtuse, entire, smooth, strongly ribbed, copiously dotted. Upper lip of the calyx very broad; lower fringed.—Native of Spain. The root is perennial. Stems apparently trailing, a span long, branched, bluntly quadrangular, finely downy. Leaves varying in size, but scarcely more than a quarter of an inch long at the most, thick, flat, without any cartilaginous edges, their ribs numerous, parallel and strong. *Footstalks* short, downy. Flowers in axillary, corymbose, downy, leafy tufts, with ovate bractes. Upper lip of the calyx remarkably broad, and rather the longest, covered with resinous dots; lower strongly fringed. *Corolla* a little longer than the calyx, pale, dotted with resinous points. The odour of the plant is most like *Th. Serpyllum*. Vahl speaks of a border to the leaves, which induces a suspicion that he took our *marginatus* for *Piperella*.

19. *Th. Brownii*. Jamaica Thyme. Swartz. Prodr. 89. Ind. Occ. 1011. Willd. n. 15. (*Th. n. 1*; Browne Jan. 259.)—Stalks axillary, thread-shaped, single-flowered. Leaves orbicular-heart-shaped, crenate, smooth. *Calyx*-teeth ovato-lanceolate, nearly equal. Stem herbaceous, procumbent.—Native of moist grassy places, near rivulets, in Jamaica and Hispaniola, flowering all summer. The root is annual, fibrous. Stems a foot long, creeping, slender, quadrangular, smooth, often purple, with short leafy branches. Leaves about half an inch long, not unlike some of our annual *Veronica*, paler beneath, on slender stalks. Flowers purplish-white, small, on long, very slender, solitary stalks. *Calyx* cylindrical, smooth, strongly furrowed, with broad pointless teeth. Swartz says it has a very strong smell, like *Mentha arvensis*.

20. *Th. filiformis*. Minorca Thyme. Ait. n. 8. Willd. n. 16.—Stalks axillary, thread-shaped, single-flowered. Leaves heart-shaped, bluntly pointed, entire, with a thick cartilaginous margin. Stems thread-shaped, decumbent.—

Native of the Balearic islands. Introduced into our green-houses in 1770, by Mr. Malcolm. The root is perennial, woody. Stems from four to six inches long, trailing, purplish, slightly branched. Leaves stalked, agreeing with those of n. 17. in their tumid margin, but not half so large, and more pointed. Flowers very small. *Calyx* ovate, furrowed; its three upper teeth broadest and shortest; lower ones fringed.

21. *Th. incanus*. Hoary Calamint Thyme. Sm. Prodr. Fl. Græc. Sibth. n. 1405. Fl. Græc. t. 577, unpublished. (*Calamintha orientalis annua*, *ocymi folio*, flore minimo; Tour. Cor. 12, by the character.)—Whorls simply stalked, of about six flowers. Leaves roundish, entire, clothed with hoary down. Beard of the calyx concealed. Stems procumbent.—Common in the islands of the Archipelago, and about Athens. The root is woody, and but for Tournefort's synonym, we should judge it perennial. Stems herbaceous, numerous, diffuse, a foot long, with opposite leafy branches, clothed, like every part of the herbage, with fine, soft, grey pubescence. Leaves stalked, convex, ribbed, rounded and blunt, half an inch in diameter. Flowers scarcely projecting beyond the leaves, on simple hairy stalks. *Calyx* ovate, tumid, ribbed; with lips of equal length; the upper broad, abrupt, three-toothed: converging hairs of the throat concealed in the tube. Upper lip of the corolla pink, hairy; lower white; palate dotted with red.

22. *Th. grandiflorus*. Large-flowered Calamint Thyme. Sims in Curt. Mag. t. 997. (*Th. carolinianus*; Michaux Boreal-Amer. v. 2. 9. *Calamintha grandiflora*; Pursh 414.)—Whorls simply stalked, of about ten flowers. Leaves ovate, serrated, nearly smooth. Beard of the calyx concealed. Stems erect, shrubby.—On the banks of the river Savannah, in Georgia and Carolina, flowering in July and August. *Pursh*. Cultivated by John Walker, Esq. at Southgate, about 1804. The root is perennial. Stems bushy, with opposite branches, a foot or more in height. Leaves stalked, deflexed, above an inch long, green, somewhat downy to the touch only. Flowers large, pale purple, with a vaulted upper lip, and a dotted palate. Upper lip of the calyx very broad.

23. *Th. Calamintha*. Common Calamint Thyme. Fl. Brit. n. 3. Engl. Bot. t. 1676. (*Melissa Calamintha*; Linn. Sp. Pl. 827. Willd. Sp. Pl. v. 3. 147. *Calamintha*; Rivin. Monop. Irr. t. 46. f. 2. Matth. Valgr. v. 2. 76. *C. vulgaris officinarum*; Ger. Em. 687.)—Whorls stalked, many-flowered, forked. Leaves hairy, with shallow serratures. Beard of the calyx concealed. Stem erect.—Native of dry banks, and the borders of fields, especially on a gravelly soil, in England and the more southern parts of Europe, flowering in July and August. The whole herb has a peculiarly sweet and grateful fragrance. The root is perennial. Stem twelve or eighteen inches high, hairy, with many opposite branches. Leaves broad, ovate, bluntish, on long stalks. Flowers copious, pale lilac, the whorls becoming leafless in the upper part of the branches. Bractes bristle-shaped, fringed. *Calyx* ovate, furrowed, bristly; its broad upper lip deeply three-cleft; lower fringed.

24. *Th. Nepeta*. Lesser Calamint Thyme. Fl. Brit. n. 4. Engl. Bot. t. 1414. (*Melissa Nepeta*; Linn. Sp. Pl. 828. Willd. Sp. Pl. v. 3. 147. Curt. Lond. fasc. 6. t. 40. *Calamintha odore pulegii*; Ger. Em. 687. *C. folio incano*; Rivin. Monop. Irr. t. 47.)—Whorls stalked, many-flowered, forked, longer than the leaves. Leaves serrated. Beard of the calyx prominent. Stem erect.—Native of chalky banks, and the borders of fields, plentifully in England, and throughout the south of Europe; very common in Greece and the Archipelago, flowering in August,

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August. The habit of this species is like the last, but with smaller *leaves*, more conspicuous longer-stalked *flowers*, and less upright *stems*. Its scent is different, and much stronger, resembling Penny-royal.

25. *Th. cephalotus*. Great-headed Portugal Thyme. Linn. Sp. Pl. 826. Willd. n. 17. Ait. n. 9. Vahl Symb. v. 3. 77. "Hoffm. et Link Lusit. v. 1. 127. t. 13." (*Tragoriganum dictamnii capite, hispanicum*; Barrel. Ic. t. 788. Bocc. Mus. 50. t. 43.)—"Heads of flowers with loosely imbricated, large, coloured bractæas, destitute of dots. Leaves linear, entire.—Native of Spain and Portugal. A shrubby bushy plant, with purplish *stems*, and downy *branches*. *Leaves* fringed at the base. *Flowers* concealed by the large purplish bractæas, forming an ovate head. Upper lip of the *calyx* rather the largest; lower fringed. We have seen no specimen, either of this or the next.

26. *Th. striatus*. Striated Neapolitan Thyme. Vahl. Symb. v. 3. 78. Willd. n. 18.—"Heads of flowers with closely imbricated, ovate, striated, dotted bractæas. Leaves linear-lanceolate, serrated, dotted in the margin."—Found by Cyrillo, in the kingdom of Naples. The *stems* are shorter and more upright than the foregoing; not branched in their upper part. *Leaves* broader, erect; striated at the back. *Heads* smaller, with smaller green bractæas. Vahl.

27. *Th. villosus*. Hairy Thyme. Linn. Sp. Pl. 827. Willd. n. 19. Ait. n. 10. "Hoffm. et Link Lusit. v. 1. 128. t. 14." Sm. Fl. Græc. Sibth. t. 578, unpublished.—Heads of flowers with imbricated, fringed, lanceolate, ternate, keeled bractæas. Leaves lanceolate, hairy, acute. Stems trailing.—Native of Portugal, Cyprus, and the Archipelago. The strong woody *root* sends out numerous, decumbent, branched, shrubby *stems*, which compose ample tufts, taking root as they spread, with short, simple, ascending flowering branches. *Leaves* clustered, nearly awl-shaped, dark green, fringed with coarse white hairs. *Bractæas* and *calyx* tinged with a violet purple; the upper lip of the latter oval, with three sharp teeth. *Corolla* rose-coloured, with a slender hairy tube, twice the length of the calyx. *Stamens* prominent.

28. *Th. Mastichina*. Mastick Thyme. Linn. Sp. Pl. 827. Willd. n. 20. Ait. n. 11. (Marum; Rivin. Monop. Irr. t. 40. Ger. Em. 670.)—Whorls stalked, many-flowered, crowded into round heads. Leaves ovate, obtuse, entire. Calyx-teeth awl-shaped, taper-pointed, all fringed, nearly uniform.—Native of stony ground in Spain and Greece. Dr. Sibthorp gathered it on mount Hymettus, near Athens, so famous for honey. This plant has been treasured up in many a rustic garden, or cottage window, ever since the days of old Gerarde; but will scarcely bear our winters unprotected, for any length of time. It flowers throughout the latter part of summer. The figure of Rivinus is cited by mistake, in the usually accurate Hort. Kew. for *Teucrium Marum*. The *stem* of the present species is shrubby, twelve or eighteen inches high, erect and bushy, with many roundish, downy, leafy branches. *Leaves* numerous, stalked, about the size and shape of *Th. Serpyllum*, but thicker, finely downy, and not fringed at the base; most hoary beneath. *Flowers* white, small, conspicuous for the long slender teeth of the *calyx*, which are pectinated with abundance of long bristly hairs. The tube is closed with copious white hairs, nor can we see any foundation for Linnæus's doubts, whether this plant should be referred to *Thymus* or *Satureja*, except the calyx-teeth being nearly equal, which is the case, more or less, with some of the foregoing. The odour of *Th. Mastichina* is pleasantly aromatic, not very pungent.

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29. *Th. Tragoriganum*. Goat's Thyme. Linn. Mant. 84. Willd. n. 21. Ait. n. 13. Turr. Farfet. 11. (*Tragoriganum majus*; Alpin. Exot. 79. t. 78. *T. secunda*, altera species; Clus. Hist. v. 1. 355. *T. cretense*; Ger. Em. 668.)—"Stem somewhat shrubby, erect. Flowers whorled. Leaves hispid, pointed."—Native of hills in Crete; as well of Cyprus and Bœotia, according to Dr. Sibthorp's manuscripts, though his herbarium contains no specimen. Neither does that of Linnæus, whose specific character we are obliged to copy. He describes it as a sweet-scented plant, with hairy *stems*, a foot high; *leaves* rather rigid, pointed at each end. The *root* appears to be woody and perennial. Whorls numerous, dense, of many *flowers*.

For *Th. virginicus*, Willd. n. 22, see PYCNANTHEMUM, n. 5. The same author has a *Th. inodorus*, n. 9, adopted from Desfont. Atlant. v. 2. 30. t. 129. A specimen apparently answering to this, gathered by Thunberg at the Cape of Good Hope, is preserved in the Linnæan herbarium, with a note at the back adverting to the singularity of a plant of the *Didynamia Gymnospermia* having alternate leaves; and it is named *Satureja alternifolia*. We do not find that either Linnæus or Thunberg ever published this plant; possibly because of the uncertainty of its genus; or it may be among those which the latter has referred in his *Prodromus* to *Selago*, several of which we have no means of determining. Whether the plant of Desfontaines be the same or no, we dare not, without examination, consider it as a *Thymus*, though he describes the *calyx* as closed with hairs, which is certainly not the case with Thunberg's specimen.

THYMUS, in Gardening, contains plants of the low, aromatic, perennial kind; among which the species cultivated are, the wild thyme (*T. serpyllum*); the garden thyme (*T. vulgaris*); the mastick thyme (*T. mastichina*); and the Virginian or savory thyme (*T. virginicus*).

In the first sort there are several varieties; as the broad-leaved, the narrow-leaved, the variegated-leaved, the silver-striped-leaved, the citron-scented or lemon thyme, and the great purple-flowered.

And in the common sort there are different varieties; as the broad-leaved, the narrow-leaved, and the variegated or striped-leaved thyme.

*Method of Culture*.—These plants may be easily raised from seed, by slipping the roots and branches, and by cuttings; but the seed method is seldom practised, except with the second sort, or garden thyme. The seed should be sown in the early spring on light, rich, dry ground, which should be properly dug over, and the surface be made moderately smooth with the spade. As the seed is small, it should not be sown too thick, or be covered too deep: the seed is best sown while the ground is fresh stirred, either broad-cast on the surface, raking it in lightly, or in flat shallow drills, earthed over thinly: the plants appear in two or three weeks. It is necessary to be careful to keep them well weeded, giving occasional light waterings in dry weather; and by June they will require thinning, especially if the plants are to grow stocky, and with bushy full heads; in which case they should be set out to six or eight inches distance; when those thinned out may be planted in another place, in rows six or eight inches asunder, giving water till fresh rooted, keeping the whole clean from weeds by occasional hoeing between them in dry days, which will also stir the surface of the earth, and much improve the growth of the plants: they will be in perfection for use in summer, or early in autumn.

Sometimes the market kitchen-gardeners raise large quantities in beds, for daily supply, leaving the whole thick:

when of proper growth they pull them clean up, root and top together, from time to time, as wanted, and tie them in bunches for sale.

But it is always proper to thin out, or transplant a quantity in single bunches, to grow stocky and bushy for occasional supplies.

Some think the common thyme best cultivated for kitchen use in beds or borders, in rows at least half a foot apart, employing for the purpose either the young seedling plants, which are fit to set out, or the root slips of old plants, each of which soon increase into plants of bushy growths proper for being cropped for the above use. It may also often be well cultivated as an edging to herbary and other compartments; in both of which methods the plants multiply exceedingly fast by offsets, and are abiding, furnishing the means of great future increase. Some should, however, always be annually raised from seed in the above manner, as such plants possess a stronger aromatic quality than those from old ones.

When it is intended to increase any particular varieties, and continue them the same with certainty, it can only be effected by slips and cuttings.

In respect to the offsets and slips, all the sorts multiply by offsets of the root and slips of the branches: the rooted slips are the most expeditious method, as the old plants increase into many offset stems rising from the root, each furnished with fibres; and by taking up the old plants in the spring, &c. and slipping or dividing them into separate parts, not too small, with roots to each, and planting them in beds of good earth, in rows half a foot asunder, giving water directly, and repeating it occasionally in dry weather till they have taken root, and begin to shoot at top; they soon grow freely, and form good bushy plants in two or three months.

The strong slips of the branches without roots, succeed when planted any time in the early spring season in a shady border, in rows four or five inches distant, giving due waterings; and become good plants by autumn, when they may be planted out where they are to remain.

The cuttings of the young branches grow readily, the same as the slips, when planted at the same season in a shady place, and well watered.

The common thyme is in universal use as a pot-herb for various culinary purposes; it may also be employed in assemblage with other small plants, to embellish the fronts of flower-borders, shrubby clumps, small and sloping banks, &c. placing the plants detached or singly, to form little bushy tufts, and in which the variegated sorts, and the silver thyme and lemon thyme particularly, form a very agreeable variety. The lemon thyme is also in much estimation for its peculiar odoriferous smell. Some of each of these sorts may also be potted, in order to be moved occasionally to any particular places as may be required, and under occasional shelter in severe winters, to preserve the plants more effectually in a lively state; likewise some of the mastic thyme. Spanish and Portugal thymes are also sometimes potted for the same purpose, and to place under the protection of a garden frame or greenhouse in winter, to continue them in a more fresh and lively growth; and sometimes some of the smaller thymes are sown or planted for edgings to particular beds or borders for variety, such as the lemon thyme, silver-leaved and variegated sorts; also occasionally the common thyme; and all kept low, close and regular, by clipping them at the sides and tops annually in the summer season.

All the several sorts and varieties possess an aromatic quality, which principally resides in the leaves, whence it is

imparted and affords a fine agreeable fragrance. But the first three kinds are by much the most noted and valued in kitchen gardens, and more especially the common thyme, which is so very useful as a culinary herb.

In gathering this for use, in common gardens, it should in general only be cut or slipped as it is wanted, in small quantities at a time, and then not stumped off in too close a manner; but the mode pursued by market gardeners is quite different, as has been already seen.

THYNI, in *Ancient Geography*, a people of Thrace, according to Strabo. Among the Thracians of Asia, mentioned by Herodotus, we are to include the Bithynians and Thynians. These people were originally of Europe, and were driven from thence by the Teucrians and Myrians. They were also called Strymonians: and upon passing into Asia, they took the name of Bithynians. The Thynians were originally Thracians; inhabiting the environs of Salmydessus and Apollonia: and upon their removal to Asia, they occupied the sea-coast, and some part of the adjacent territory. These people had acquired the art of engraving precious stones: accordingly we find the following verse of Mevcnas upon the death of Horace, preserved by Isidore in his *Origines*:

“Nec per candida margarita quæro  
Nec quos Thynica lima perpolivit,  
Amellos, nec jaspios lapillos.”

THYNIA, a country of Asia, in Bithynia. Pliny.

THYNIAS, an island of the Euxine sea, opposite to Bithynia, according to Pliny, but on the coast of Bithynia, according to Strabo.

THYNNIA, *θυμία*, in *Antiquity*, a sacrifice offered to Neptune by the fishermen, after a plentiful draught.

The word comes from *θυνοί*; a tunny, that being the sacrifice offered.

THYNNUS, in *Entomology*, a genus of the Hymenoptera order of insects: the characters of which are, that the mouth is horny; the mandible bent, with a short jaw, straight; the lip larger than the jaws, with the apex membranaceous; trifid; the intermediate fringes emarginate; the tongue very short or folded; the four palpi filiform and equal; the antennæ filiform. Gmelin enumerates three

Species.

DENTATUS. With black abdomen; the second, third, and fourth segments marked with two white points. Found in New Holland.

EMARGINATUS. With black abdomen, the segments having a yellow interrupted band; the scutellum emarginate. Found in New Holland.

INTEGER. Black, with the segments of the abdomen villose-cinereous at the margin, and the anus entire. Found in New Holland.

THYNNUS, in *Ichthyology*. See TUNNY, and SCOMBER, of which it is species.

THYOS, *θύος*, in *Antiquity*, an offering of fruits, leaves, or acorns, which were the only sacrifices at first in use.

THYRÆL, in *Ancient Geography*, a people of Italy, in Japygia, who inhabited the middle of the isthmus, between Tarentum and Brundisium, according to Strabo.

THYREA, a town of the Argolide, upon an eminence, in that part which adjoined Laconia, that is, on the western coast of the Argolic gulf. The country in which it was situated bore the name of Cynuria or Cynouria.—Also, a town of Greece, in the Phocide, where, according to Pausanias, Phocus, the son of Harmythion, placed a colony.—

Also,

Alfo, a place fituated on the coaft of the Peloponnefus. According to Herodotus, the inhabitants of Hermione gave it to thofe of Samos.

THYREUM, a fmall town of Arcadia, S. of Megalopolis. It was deferted in the time of Paufanias.

THYRIDES, a town of Laconia, S.E. of Meiffa. Near this place were the ruins of the town of Hippola, in the midft of which was feen, in the time of Paufanias, a chapel of Minerva Hippolaitis.—Alfo, the name of the fummit of Tænarus, in the Peloponnefus; 30 ftadia from the promontory Tænarum. Pliny gives the name of Thyrides to three iflands of the gulf Afiræus.

THYROID, in *Anatomy*, *thyroideus*, or more properly *thyroideus*, from *θυροειδης*, compounded of *θυρος*, a *fhield*, and *ειδος*, *form*; a name given to one of the cartilages of the larynx (fee LARYNX), to a gland fituated near that cartilage (fee LARYNX), and to the arteries and veins of the gland. See ARTERY and VEIN.

Thyroid Gland, *Difeafed*. See BRONCHOCELE.

Thyroid Gland, *Extirpation of*. It cannot be doubted that this operation is one of the moft difficult and dangerous in the practice of furgery; and it ought never to be undertaken, except under the moft urgent circumftances, and by operators of confummate fhill and judgment. Were a furgeon, fuperficially acquainted with anatomy, and little accuftomed to attempts of fo bold a kind, to undertake the operation of cutting away a difeafed thyroid gland, he would run the utmoft risk of feeing the patient bleed to death under his hands.

The following is a memorable inftance of the fuccefsful performance of this operation. In the year 1784, J. Hyons, twenty years of age, experienced an acute pain at the middle and anterior part of the neck, in confequence of a violent extension of the head. This pain, which was only momentary, was followed by fome difficulty of motion. About three months afterwards, a fmall, hard, indolent tumour appeared on the right fide of the trachea. The fwelling was unattended with pain, or alteration in the colour of the integuments. The tumour feemed to be raifed by a pulfatory action, which tended to prove the exiftence of a large artery underneath, and, in fact, its bafe was fituated on the general courfe of the carotid artery. The patient feeling no inconvenience, neglected it until June 1788. At this time it was an inch in diameter. Its progrefs, which in the firft inftance was flow, now augmented with proportionable rapidity. Internal remedies and topical applications had no effect in preventing its increafe. A fluctuation in its centre was foon evident: an incifion was then made into this part, and a quantity of yellow ferofity difcharged. Three months after this operation, which was not of the leaft fervice, recourfe was had to cauftics, which were repeatedly applied without any advantage. On the 20th of March 1791, fhe prefented herfelf for admiffion at the Hôtel-Dieu. At this period the tumour was two inches in diameter, round, hard, and attached to the right and middle part of the trachea, and it pushed outwards the fterno-maftoideus mufcle. Independently of its being fenfibly raifed by each pulfation of the arteries, it obeyed the motions of deglutition, and in a flight degree impeded the paffage of the folid aliment. The patient, earneftly defiring to get rid of fo inconvenient a deformity, determined to fubmit to its extirpation, which appeared her only refource. The danger, the length of time, and the pain neceffarily annexed to the operation, were not concealed from her. The operation, after a few days previous preparation, was performed in the amphitheatre by Default in the following manner: the patient being laid on

her back, a little inclined on the left fide, with the head and neck more raifed than the reft of the body, the furgeon made a longitudinal incifion through the middle of the tumour, beginning one inch above, and finifhing one inch below, to allow room to finifh the operation with eafe: in the firft fection he cut down as far as the gland, dividing the integuments, the platyfma-myoides, and fome fibres of the fterno-hyoideii and fterno-thyroideii mufcles; an affiftant, with the view of fixing the tumour, drew towards the left the infide edge of the wound made by the incifion, whilft the furgeon detached it from the fterno-maftoideus mufcle. In diffefting the cellular fubftance which united the parts, two fmall arteries were divided, which were raifed by a pair of diffefting forceps and fecured by ligatures. The external furface of the tumour being thus difengaged, the internal part was detached in the fame way. The tumour was drawn outwards by means of a hook, that it might be feparated with more eafe from the anterior part and from the fide of the trachea. In the courfe of this diffeftion, the branches of the thyroid arteries were fuccefsively tied, as faft as they were divided. The affiftant, to whom the hook was confided, directed the gland from within and forwards, whilft the furgeon finifhed the diffeftion outwards and from above downwards. This part of the operation was the moft minute and difficult: it was neceffary by means of a fponge continually to wipe away the blood, which neceffarily prevented the parts from being eafily diftinguifhed, and obliged the furgeon to divide but a little at a time, and previously to feel with his finger thofe parts he was about to incife. By this cautious diffeftion of parts, the fuperior and inferior thyroid arteries were laid bare, and afterwards fecured by ligature by means of a blunt crooked needle. They were afterwards tranfverfely divided, and the remaining part of the tumour detached from the trachea, to which it ftrongly adhered. The wound refulting from this operation was near three inches in depth: it was outwardly bounded by the fterno-maftoideus mufcle, and inwardly by the trachea and œfophagus; pofteriorly by the carotid artery, and by the nerves of the eighth pair, which were expofed at the bottom of the wound. After the wound was well wafhed with warm water, and cleared from the blood, it was filled with coarfe lint, powdered with colophony; fquare compreffes, fecured by a bandage moderately tight, formed the reft of the dressing. The extirpated tumour was five inches in circumference; and on examination was found to differ in no particular from fchirrous glands, except that in the centre there was a cartilaginous nucleus. The patient fupported this long, difficult, and painful operation with uncommon firmnefs: fhe paffed the reft of the day without experiencing any other fymptom than a flight fhivering, generally confequent to large wounds. The following night fhe complained of a fenfe of heat in the neck, and fome difficulty in deglutition. The next day a little eafe was obtained by moiftening the dressing with a decoction of marfhmallows. A weak drink of the herb dog's-tooth, acidulated with oxymel, was prefcribed. On the third day the fever was very moderate, but the difficulty in fwallowing had confiderably increafed at this period; the compreffes and the external lint were removed, and frefh applied. On the fourth, the fever ceafed, and deglutition became lefs painful. Suppuration now became eftablifhed. The next day all the lint was detached, and the whole of the dressings renewed. The wound was in a good ftate: it was dressed with foft lint and compreffes moiftened with an emollient decoction; a practice which was continued for the following days. No particular circumftance occurred during the cure. The wound followed the ordinary pro-

grefs, and was cicatrized at the end of a month. The patient left the hospital, perfectly cured, the 34th day after the operation. See Default's Parisian Chirurgical Journal, vol. ii. p. 292—296.

To the preceding case, the editor of the above work has annexed the few following reflections.

The extirpation of the thyroid gland is an operation extremely difficult, and certainly highly dangerous, when performed by an operator but moderately exercised in the practice of his profession. The number and size of the arteries necessary to divide, the proximity of the trachea, œsophagus, and carotid, near which the knife must necessarily pass, are the principal dangers that the operator should avoid. These are the circumstances which have deterred the majority of practitioners from performing it, particularly those who from long established prejudice have been deterred from using ligatures in cases of wounded arteries. Examples of this operation are very rare. The first time that Gooch undertook to perform it, he was deterred from finishing it by the hemorrhage, and his patient died on the eighth day. The second time he succeeded better, but was incapable of securing the vessels, and succeeded in stopping the hemorrhage, which would otherwise have been mortal, by causing the parts to be compressed by the hand of an assistant for the space of eight days. Gooch's Med. and Chir. Obs. p. 130. Bell's System of Surgery, vol. v. p. 525. And La Bib. Chir. de Richter, l. 2. 4e partie, p. 128.

A. F. Vogel and Theden have practised the same operation with the most complete success. All danger from the hemorrhage, or inconvenience arising from the discharge of blood, may be obviated by pinching up the small vessels, tying them as fast as they are divided, and by discovering and tying the large vessels previous to their division; other parts that cannot be wounded without danger, are to be avoided by dissecting slowly and a little at a time, and feeling with the finger every part previous to its division with the bistoury.

THYRO-ARYTENODEUS, a muscle of the larynx. See LARYNX.

THYRO-EPIGLOTTICUS, a supposed muscle of the larynx. See LARYNX.

THYRO-HYOIDEUS, a muscle passing between the os hyoides and the thyroid cartilage. See LARYNX.

THYRO-PHARYNGEUS, a portion of the inferior constrictor of the pharynx. See DEGLUTITION.

THYROIDEÆ *Glandula Musculus*. See the description of the thyroid gland in the article LARYNX.

THYRRÆUM VINUM, a sort of wine among the ancients, remarkable for its thickness and dark colour; it was sweet and luscious, and not astringent.

THYRREUS LAPIS, in *Natural History*, the name of a fossil, which the writers of the middle ages have called *syrus*.

It has many virtues ascribed to it; but all the accounts we have of its real properties are from Pliny, who observes, that it swam upon the water while whole; but when broken into small pieces, these sunk to the bottom. It seems to have been a sort of bitumen of a spongy structure.

THYRSINE, in *Botany*, probably from its dense cluster-like appearance, a name given by Gleditsch to the *Cytinus*, (see that article,) in a treatise published in his *Physic*. Botan. Oecon. Abhandlungen, v. 1. 199. t. 2. He is cited in Schreb. Gen. 609, and Willd. Sp. Pl. v. 4. 589.

THYRSUS, *Θυρσος*, in *Antiquity*, the sceptre which the ancient poets put in the hands of Bacchus, and with which they furnished the Mænades in their Bacchanalia.

The thyrsus was originally a lance or spear, wrapped up in vine leaves; with which Bacchus is said to have

armed himself and his soldiers in his Indian wars, to amuse and deceive the unpractised Indians, and make them suspect no hostilities.

Hence it was afterwards borne in the feast and sacrifices of that god; and as the Satyrs, who were Bacchus's soldiers, were supposed to have fought with it, it became a custom to represent them therewith.

THYRSUS, *Oriflagni*, in *Ancient Geography*, a river of the isle of Sardinia, which ran from N. to S. and discharged itself towards the W. into the sea.

THYRSUS, in *Botany*, a Bunch, is a mode of inflorescence, nearly allied to a *Racemus*, or Cluster, except in being compound, in which it agrees with a Panicle. Its form is more or less ovate, and the disposition of the branches and subdivisions is either opposite or alternate; the ultimate one sometimes obscurely umbellate. Examples are found in the Lilac, *Syringa vulgaris*, and a bunch of Grapes, *Vitis vinifera*; as well as in the herbaceous plants *Tussilago hybrida* and *Petasites*. Hence it appears that a *Thyrsum* is nothing more than a dense or close Panicle; and in the examples last cited, this mode of inflorescence actually becomes a loose panicle, as the plant perfects seed. See PANICULA and INFLORESCENCE.

THYSANOTUS, *βυσαντος*, *fringed*, a very descriptive name of Mr. Brown's, which he complains of Mr. Salisbury for having knowingly suppressed.—Brown Prodr. Nov. Holl. v. 1. 282. (*Chlamysporum*; *Salif. Parad. 103.*)—Class and order, *Hexandria Monogynia*. Nat. Ord. *Coronarieæ*, Linn. *Asphodeli*, Juss.

Gen. Ch. *Cal.* none. *Cor.* inferior, of one petal, in six deep, spreading, permanent segments; the three inner ones broadest, fringed at the edges with jointed hairs; the three outermost externally of the texture of a calyx. *Stam.* Filaments six, awl-shaped, smooth, much shorter than the calyx, inserted into its base; anthers linear, incumbent, attached by the sinus at their base, a little unequal at the end, the three outer ones generally elongated and reclining. *Pistl.* Germen superior, roundish; style thread-shaped, declining, about the length of the stamens; stigma simple. *Peric.* Capsule oval, of three cells and three valves, with a partition from the centre of each, enveloped in the withered corolla. *Seeds* two in each cell, one erect, the other pendulous, roundish, somewhat stalked, inserted into a cup-shaped white appendage; albumen dense, fleshy.

Obs. A few species have only three stamens.

Ess. Ch. Corolla in six deep segments; the three innermost broadest, fringed; permanent. Stamens smooth. Capsule superior, of three cells and three valves. Seeds in pairs, with cup-shaped appendages.

A rather numerous genus of perennial herbaceous plants, natives of different parts of New Holland. The root is either fibrous, or consists of clustered fleshy bulbs. *Stem* generally branched and leafy. *Leaves* linear, narrow, often channelled, sometimes thread-shaped, or shortened. *Flowers* terminal, umbellate; rarely scattered; their stalks jointed in the middle. *Corolla* blue within; three, at least, of its segments green at the back. *Anthers* purple; the outer ones sometimes whitish, which in the triandrous species are wanting. *Seeds* black. The permanent *corolla*, and smooth *filaments*, principally distinguish this genus from Mr. Brown's *Arthropodium*, Prodr. Nov. Holl. v. 1. 276, by which it is related to the Linnæan *Anthericum*. The learned author whom we follow defines twenty-one species, of which he seems doubtful whether any one has ever been introduced into the English gardens, at least so as to bear flowers; for he thinks the figure in Parad. Lond. was done from

from a dried specimen. On this subject we have no particular information. Several drawings of this genus and its allies, made in New Holland, have passed under our inspection, and display a degree of elegance which renders the plants highly desirable.

Of the twenty-one species, seventeen are hexandrous, four triandrous.

Sect. 1. *Stamens six.*

*Th. tuberosus.* Tuberous Fringe-blossom. Br. n. 1.—“Bulbs fasciculated, stalked. Radical leaves channelled, lax, smooth, rather shorter than the round, smooth, pinnated stem. Umbels of two or three flowers. Anthers unequal.”—Gathered by Mr. Brown, near Port Jackson, New South Wales.

*Th. junceus.* Rush-leaved Fringe-blossom. Br. n. 9. (*Chlamysporum junceifolium*; Salis. Parad. t. 103.)—“Root fibrous. Stems branched, diffuse, round, striated; branches slightly angular. Radical leaves short; those of the stem straight, slightly spreading. Umbels of few flowers. Anthers unequal.”—Native likewise of Port Jackson, from whence we have received specimens by favour of Dr. White. The stems are about a foot long, diffuse, according to Mr. Brown, smooth, slender, rushy, alternately branched.—Flowers about an inch in diameter, their inner segments obtuse, delicately fringed. They are said to be very transient.

*Th. dichotomus.* Forked Fringe-blossom. Br. n. 14. (*Ornithogalum dichotomum*; Labillard. Nov. Holl. v. 1. 83. t. 109.)—Root fibrous. Radical leaves hispid. Stem round, striated, with numerous rather spreading branches; forked above. Flowers solitary. Anthers unequal.—Gathered in Lewin's land by M. Labillardiere, from whom we have a specimen. The stem is 15 or 18 inches high, repeatedly divided from the bottom, so as to be almost corymbose at the top, roughish to the touch, slightly leafy. Radical leaves numerous, about four inches long, erect, linear, obtuse, entire, channelled, rough with short, rigid, pale, prominent hairs; sheathing at the base: those of the stem solitary under each branch, short, awl-shaped, striated, clasping the stem with a dilated, membranous margin in the lower part. Flowers terminal, two or three to each branch, but it appears to us that the individual ones are solitary. Three inner segments purple on the inside, with a fringe of the same colour; their outside, like the whole of the outer ones, green. Anthers but slightly, if at all, unequal. Valves of the capsule beaked.

Sect. 2. *Stamens three.*

*Th. triandrus.* Triandrous Fringe-blossom. Br. n. 18. (*Ornithogalum triandrum*; Labill. Nov. Holl. v. 1. 84. t. 110.)—“Root fibrous. Leaves linear, fringed, the length of the smooth unbranched common flower-stalk. Umbel many-flowered. Lower joint of each partial stalk several times longer than the bractæas.—Gathered by Labillardiere, in Lewin's land. Stalks one or more, compressed, a span high, as well as the numerous, all radical, leaves. Umbel of about nine flowers; its stalks jointed below the middle. Stamens but three, opposite to the three fringed segments of the corolla, which are purple on the inside.

THYSANUS, from *ὑσανος*, a fringe, because of the fringed tunic of the seed.—Loureir. Cochinch. 284.—Class and order, *Decandria Tetragynia*. Nat. Ord. *Terebinaceæ*, Juss.?

Gen. Ch. Cal. Perianth inferior, of five coloured, permanent, lanceolate, concave, hairy, spreading leaves. Cor. bell-shaped, of five spreading oblong petals, the size of the calyx. Stam. Filaments ten, short, reflexed; anthers roundish, erect, of two cells. Pist. Germen superior,

quadrangular; styles four, thread-shaped, inserted laterally into the four angles of the germen; stigmas slightly cloven. Peric. Drupas four, oblong, gibbous, recurved at the point, with a woolly coat, bursting laterally. Seeds. Nuts solitary, oblong-ovate, smooth, naked at the top, enveloped in their lower part with a fleshy, fringed, red tunic.

Eff. Ch. Petals five. Drupas four, gibbous. Nuts with a fringed tunic.

1. *Th. Palala.* Deei Khê of the Cochinchinese.—Native of the woods of Cochinchina. A large, woody, nearly erect, branching shrub, without thorns. Leaves pinnate, of about ten pair of oblong, entire, smooth leaflets. Stalks axillary, many-flowered. Calyx red. Corolla white. Wing, or tunic, of the nuts red.

Such is the description of Loureiro, who quotes, with a mark of doubt, *Palala secunda*; Rumph. Amboin. v. 2. 26. t. 6. But that is a *Myristica*, and has simple leaves. Yet hence the specific name appears to be taken. He more justly indicates the affinity of his plant to *Sinnaba*; Aubl. Guian. 400. t. 153, of which we propose to treat hereafter in its proper place, under Schreber's name of ZWINGERA.

We presume Loureiro's *Thysanus* to be very nearly related to *Cnestis* of Lussieu and Willdenow; see that article. The number of germens may be very variable or uncertain. What the author terms a *drupa*, appears, from its bursting laterally, to be a true follicle, as is the seed-vessel of *Cnestis*. Whether the seed of the latter has any thing analogous to the fringed tunic, does not appear.

THYSDRUS, in *Ancient Geography*, a town of Africa Propria, and one of those which, according to Ptolemy, lay to the S. of Adrumetum.

THYSIUS, (THYS,) ANTONY, in *Biography*, a philologist, was born at Leyden in 1603, and became professor of eloquence and poetry in the university of his native city, and public librarian. Besides two or three works of his own, he was the editor of several editions of classics called “*Variorum*,” of which were “*Valerius Patereulus*,” “*Sallust*,” “*Valerius Maximus*,” “*Seneca the Tragedian*,” “*Lactantius*,” and “*Aulus Gellius*.” He died in 1670.

THYSSAGETÆ, in *Ancient Geography*, a people who inhabited the territory near the Sarmatæ, where was the source of the river Tanais. Ammianus Marcellinus says that these people had their abode in large forests, and lived by the chase. Their wives and children they had, he says, in common. Herodotus says they were a numerous nation, and governed by their own laws. Hardouin, in his notes on Pliny, says that they inhabited the banks of the Tanais, towards that bend of the river, where it most nearly approaches the Wolga, and which is now the territory of Astrachan.

THYSSELINUM, in *Botany*, a name adopted by Lobel in his *Icones*, 711, for the *Selinum sylvestre* of Linnæus. Lobel cites Pliny, but the name in that author is *Thysseium*. The plant to which it belonged was “not unlike parslley, *Apium*; its root when chewed purged humours from the head.” Rivinus, *Pentap. Irr.* t. 19 and 20, has the Linnæan *Selinum sylvestre* and *palustre* under the generic name of *Thysseium*, as has Tournefort likewise, in his *Institutiones*, 319. The latter distinguishes his genus from *Oreoselinum* solely by its milky juice. As this juice is highly acrid, these authors should seem to consider the word as derived from *ὑς*, to burn, and *σῆνον*, parslley. Linnæus omitted the first syllable as, in his opinion, superfluous,

fluons, and even Haller follows his example. See *SE-LINUM*.

**THYSSUS**, in *Ancient Geography*, a town of Macedonia, on and about mount Athos. Pliny and Thucydides.

**THYSTIUM**, or **THYTIUM**, a town of Etolia. Suidas.

**TIABA**, a town of Asia Minor, in Caria. Strabo.

**TIAGAR**, a town in the interior of Arabia Felix, between Inapha and Appa. Ptolemy.

**TIAGAR**, in *Geography*, a town of Hindoostan, in the Carnatic; 50 miles W.S.W. of Pondicherry. N. lat.  $11^{\circ} 42'$ . E. long.  $79^{\circ} 12'$ .

**TIAGNANUCO**, a town of Peru, in the diocese of La Paz. This is a town of great antiquity, and is said to have received its name from one of the Incas. In it are some statues, and a colossal pyramid, with a variety of human figures cut out of stone, which, though decayed by time, appear to have belonged to some gigantic nation; 36 miles N.W. of La Paz.

**TIAGURA**, in *Ancient Geography*, a town of India, on this side of the Ganges, and E. of the river Nomadus. Ptolemy.

**TIANG-POTAO**, in *Geography*, an island of Corea, about thirty miles in circumference, in the Hoang-hai. N. lat.  $37^{\circ} 20'$ . E. long.  $124^{\circ} 52'$ .

**TIANO**. See *THEANO*.

**TIANO**, a small island in the North sea, near the coast of Lapland. N. lat.  $68^{\circ} 42'$ .

**TIANTEGNIES**, a town of France, in the department of Jemappe; 6 miles S.W. of Tournay.

**TIANTONG**, a town of Upper Siam, on the Mecon; 60 miles N.W. of Porfelooc.

**TIAOYU-SU**, a small island in the Chinese sea, belonging to those called Lieou-kieou. N. lat.  $25^{\circ} 55'$ . E. long.  $123^{\circ} 37'$ .

**TIARA**, *τιρα*, an ornament, or habit, with which the ancient Persians covered their heads; and which the Armenians and kings of Pontus wear on medals: these last, because descended from the Persians.

Latin authors call it indifferently *tiara* and *cidaris*.

Strabo says, the tiara was in form of a tower; and the scholiast on Aristophanes's comedy, *Αχαρναι*, act i. scene 2. affirms that it was adorned with peacocks' feathers. Some moderns, however, fancy the scholiast is here speaking of the casque which the ancient Persians wore in war, rather than of the habit which they wore on the head in the city.

The kings of Persia alone had the right of wearing the tiara straight and erect; the priests and great lords wore it depressed, or turned down on the fore-side. Xenophon, in his *Cyropædia*, says that the tiara was sometimes encompassed with the diadem, at least in ceremonials; and had frequently the figure of a half-moon embroidered on it: others are of opinion, that the diadem was in figure of a moon; and that it was hence the *tiara* was called *lunata*. Lastly, others think that the tiara itself was made sometimes in form of a half-moon. From what we have said, it appears that there were different forms of tiaras; and, in effect, Pachelius, De Coronis, distinguishes no less than five different kinds. See *DIADEM*.

The tiara was also an ornament belonging to the Jewish priests. Exod. xxviii. 40. xxxix. 26.

**TIARA** is also the name of the pope's triple crown; anciently called *regnum*.

The tiara and keys are the badges of the papal dignity; the tiara of his civil rank, and the keys of his jurisdiction: for as soon as the pope is dead, his arms are represented with the tiara alone, without the keys.

The ancient tiara of the popes was a round high cap.

Boniface VIII. first encompassed it with a crown. Benedict XII. added a second crown; and John XXIII. a third.

**TIARANTUS**, in *Ancient Geography*, a river of Scythia, which ran into the Danube; now the *Alut*.

**TIARE**, a town of Asia Minor, in the Troade. Pliny.

**TIARELLA**, in *Botany*, the diminutive of *τιρα*, a Persian diadem, or ornament for the head. This name alludes to the form of the seed-vessel, and was contrived by Linnæus to preserve an analogy with *MITELLA*, see that article, to which the present genus is next akin.—Linn. Gen. 223. Schreb. 301. Willd. Sp. Pl. v. 2. 659. Mart. Mill. Diâ. v. 4. Ait. Hort. Kew. v. 3. 72. Pursh 659. Juss. 309. Lamarck Illustr. t. 373.—Class and order, *Decandria Digynia*. Nat. Ord. *Succulenta*, Linn. *Saxifrage*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, in five deep, ovate, acute, permanent segments. Cor. Petals five, oblong, their claws inserted into the calyx. Stam. Filaments ten, capillary, longer than the corolla, inserted into the calyx; anthers incumbent, orbicular. Pist. Germen superior, cloven, terminating in two very short styles; stigmas simple. Peric. Capsule oblong, somewhat compressed, of one cell and two flattish valves, one of them twice as long as the other. Seeds numerous, ovate, polished.

Eff. Ch. Calyx in five deep segments. Petals five, undivided, inserted into the calyx. Capsule of one cell, with two unequal valves.

Obf. The undivided petals, and the inequality of length in the two valves of the capsule, distinguish this genus from *Mitella*.

1. *T. cordifolia*. Heart-leaved Tiarella. Linn. Sp. Pl. 580. Willd. n. 1. Ait. n. 1. Pursh n. 1. Lamarck as above. (*Cortusa americana*, flore spicato, petalis integris; Herm. Parad. 129, without a figure.)—Leaves heart-shaped, acutely lobed, with pointed teeth. Cluster simple, ovate.—Native of the shady woods of Canada, and the high mountains of New York and Pennsylvania, flowering in April and May. Pursh. It is hardy in our gardens, flowering at the same season, but chiefly preserved in the more curious collections only. The root is tuberous, with many blackish fibres, perennial. Leaves several, all radical, light green, hairy, elegantly lobed and veined, acute, about an inch and half in diameter, on erect, simple, hairy footstalks, thrice as much in length. Flower-stalk radical, mostly solitary, unbranched, hairy, taller than the leaves, bearing a simple downy cluster, an inch long, of about twenty small, delicate, white flowers, which is subsequently elongated as the fruit ripens. The capsules then become deflexed, two-lipped, ribbed, smooth, and shining. It is wonderful that every author should persist in quoting, after Linnæus, the plate of Hermann's *Paradisus*, which is evidently *Heuchera americana*, and is mentioned under the name of *Cortusa americana*, flore squallidè purpureo, in the text of the same work, p. 131; where also this figure is referred to. The editor, having committed a double blunder, in the title of the plate and its reference, 130 instead of 131, is in some measure responsible for the mistake; which however the compound *panicula*, and closed calyx, ought to have sooner corrected.

2. *T. Menziesii*. Slender-spiked Tiarella. Pursh n. 2.—“Leaves ovate-heartshaped, acute, toothed, with shallow lobes; those of the stem alternate, remote. Cluster thread-shaped, somewhat spiked. Calyx tubular.”—Gathered by Mr. Menzies, on the north-west coast of America. Perennial. More than a foot high, with five or six alternate leaves on the stem. Pursh.

3. *T. trifoliata*. Three-leaved Tiarella. Linn. Sp. Pl. 580. Willd. n. 2. Pursh n. 3. (*Mitella foliis ternatis*; Linn. Am.

Am. Acad. v. 2. 351.)—Leaves ternate, lobed and toothed. Stem leafy. Cluster compound.—Gathered by Mr. Menzies on the north-west coast of America, where it is frequent in woods. Linnæus saw it only in the collection of plants from Kamtschatka, submitted to his inspection by Demidoff, and described in the 2d volume of the *Amanitates Academicæ*; for there is no specimen in his own herbarium. The root is tuberous, and somewhat creeping, perennial. Stems above a foot high, erect, simple, leafy, smooth and slender. Leaves all ternate, slightly hairy, paler beneath; the leaflets somewhat rhomboid, acute, more or less deeply lobed, and irregularly notched, an inch or an inch and half in length; the lateral ones often deeply divided; so that they much resemble some of the more delicate species of *Rubus*. The radical leaves have long slender footstalks; those on the stem short ones. Cluster many-flowered, from three to six inches long, alternately branched; the branches corymbose, each bearing from three to six or seven very small greenish-white flowers. The base of the calyx is concave, or slightly bell-shaped. Capsule half an inch long, each valve tipped with a permanent, elongated, capillary style.

4. *T. biternata*. Compound-leaved Tiarella. Venten. Malmaif. t. 54. Pursh n. 4.—Leaves twice ternate, lobed and toothed. Stem leafy. Panicle compound, divaricated; its branches somewhat spiked.—Found on the mountains of South Carolina, flowering in May. Root perennial. Stem a yard high. The appearance of the plant is justly compared by Ventenat to *Spiræa Aruncus*. The leaves consist of nine large ovate leaflets, slightly hairy, partly lobed, and all strongly toothed, or notched. Flowers very small, yellowish-white, almost sessile, disposed in numerous long clusters, forming a large, spreading, repeatedly branched panicle. The petals in Ventenat's figure are narrow, elliptic-lanceolate. Pursh says they are sometimes wanting. The appearance of the capsule in that figure is very different from the other species, and the valves are of equal length. This plant is said to have proved biennial in the garden of Malmaison; but it may still be perennial in its native country. We have seen no specimen, nor has this curious species, any more than the last, yet found its way into the English gardens.

TIARINI, ALESSANDRO, in *Biography*, an historical painter, who was born at Bologna in 1577. He was first a disciple of Prospero Fontana, but on the death of that master, he received instructions from Bartolomio Cesi, from whom, being obliged to leave Bologna on account of a quarrel, he went to study under Passignano at Florence. After some time, about seven years, as the influence of the circumstance which had driven him from his native city subsided, he ventured to return there, and became a pupil of the Caracci; and he principally attached himself to Ludovico, more for the improvement of his style, than for practice.

He had, during his residence at Florence, acquired considerable fame, and painted several pictures for churches and convents in places within and round about that city. On his return to Bologna, his talents acquired him considerable employment there, and many of his principal works still adorn its public edifices. Ferdinand, duke of Mantua, invited him to take up his residence with him; sat to him for his portrait, as did all the princes of his family, and many of the nobles of his court.

The colouring adopted by Tiarini in his best time is clear and rich; his design tasteful and agreeable, though of a serious cast; and his expression just and natural: and there are not many artists who have done more credit to the Bolognese school. He died in 1668, at the advanced age of 91.

TIARIULIA, in *Ancient Geography*, a town of Hif-

pania Citerior, in the interior of the country of the Hercaons. Ptol.

TIARP, in *Geography*, a town of Sweden, in Westmanaland; 25 miles N. of Uplal.

TIASSE, in *Ancient Geography*, a river of the Peloponnesus, in Laconia, which ran between Sparta and Amyclæ. Paufanais.

TIASUM, a town of Dacia, in the vicinity of Nantidava and Zugma. Ptol.

TIAUSPÀ, a town of India, on this side of the Ganges, W. of this river and near it. Ptol.

TIB, in *Geography*, a town of Persia, in Chusistan, or Kuzistan; 60 miles N.W. of Shuster.

TIBAENS, a town of Portugal, in the province of Entre Duero e Minho; 4 miles W. of Braga.

TIBALDI, PELLEGRINO, in *Biography*, was born at Bologna in 1527. He was the pupil of Bagnacavallo, and copied with much attention the works of Vafari, in the refectory of S. Michele in Bosco. At the age of twenty he went to Rome, chiefly to study the works of Michael Angelo. The pictures he produced at Rome obtained for him the patronage of the cardinal Poggi, who employed him in ornamenting his Vigna, near the Porto del Popolo, with works in fresco, and then sent him back to Bologna, to assist in the completion of his palace there (now the Academical Institute), both as architect and painter; and in both characters it remains as the principal testimonial of his powers remaining in Italy. He also constructed and adorned a chapel for his patron in the church of S. Giacomo Maggiore. One of the paintings he executed there was the Preaching of St. John, and another, the Last Judgment; where, in the opinion of the Caracci, he almost equalled the majesty of Michael Angelo, and it was preferred by them to all the other works of Pellegrino, and served them and their scholars as a model of study.

From Bologna, the cardinal sent him to Loretto, to superintend the erection of a chapel in the church of La Madonna, which he also ornamented with stuccoes and paintings of the Nativity, the Presentation in the Temple, the Transfiguration, and the Decollation of St. John. From thence he went to Ancona, where he wrought in the churches of S. Agostino and Ciriaco; and in the great hall of the merchants he painted one of his most celebrated pictures, the subject of which is Hercules overthrowing monsters. He also superintended, as military architect, the fortifications of the place, about the year 1560; and two years afterwards visited Pavia, where he constructed the palace of the Sapienza; he then went to Milan, and there built the temple of S. Fidele, and before the year 1570 was elected architect of the cathedral.

Here he disencumbered the dome of numerous Gothic monuments, sepulchral urns and trophies, and embellished it in their stead with various chapels and a majestic choir. He soon after received a commission from Philip II. to prepare designs and plans for adorning the Escorial, both architectural and pictorial. He followed them to Spain himself in 1586. There he superintended the work for nine years, painting a great number of pictures, particularly some in fresco in the lower cloister, whence he expunged the unsuccessful productions of F. Zuccherò. The subjects were from scripture, of the Purification; the Flight into Egypt; the Murder of the Innocents; Christ tempted in the Wilderness; the Election of the Apostles; the Resurrection of Lazarus; the Expulsion of the Money Changers from the Temple; and the Resurrection of our Saviour. Besides these, he painted during his residence in Spain several pictures

tures for other places, particularly for the great church at Madrid, where there are five pictures by him. But his most renowned work, and which most contributed to establish his fame in Spain, was the ceiling of the library of the Escorial, where he appears to have rivalled the composition of the school of Athens by Raphael; with beautiful groups of children and figures supporting the cornices and festoons in great varieties, and foreshortenings worthy of an imitator of the style of Michael Angelo. For the extraordinary talents which he exhibited in these great works, Philip loaded him with riches and honours, and even gave him patents of nobility, creating him marquis of Valdelfa; a district in which his father and his uncle had laboured in the humble capacity of masons. He lived to an advanced age, but the exact year of his death is not known, though it is thought to have been about 1600.

Pellegrini Tibaldi is considered, and with sufficient evidence from his works, as the greatest designer of the Bolognese and Lombard schools. He approaches the line of Michael Angelo nearer than all the rest of his imitators; but as he had decidedly adopted the technic without always penetrating the moral principles of his model, the manner of the master frequently became the style of the pupil; though it cannot be denied that he often united energy of attitude and grandeur of line, with sublimity of conception and dignity of motive. Of these he has given no where more signal proofs than in the ceilings and the compartments of the Academical Institute at Bologna. They represent various scenes from the Odyssey; among them, Polypheme waking under the pangs of the fiery point, though painted with a sentiment of original expression, is evidently imitated from the newly created figure of Adam in the Sistine; but the same Cyclops groping at the entrance of his cave to prevent the escape of Ulysses and his associates, is in conception of the whole, and in the detail of the parts, an original invention; a form, than which Michael Angelo himself never conceived one of greater energy, with expression, attitude, and limbs more in unison. With this may be placed that wonder of foreshortening, excentricity, and rotundity, the figure of Elpenor, on one of the architraves of the Salotto, represented in the moment when, yet dreaming, he leaves his hold, and is precipitated from the roof. The air of originality which this figure in every view presents, and the elegance with which the imitator has reversed the figure in the Last Judgment of Michael Angelo, from which he borrowed the principal limbs of his own, place him on a level with the inventor.

It was, however, less for the powers exerted by Pellegrino, in the decorations of the Institute, than for the celestial principle which they discovered in his subsequent works, that the Caracci gave him the epithet of *Michel Angelo riformato*, and commended

“Del Tibaldo il decoro e il fondamento.”

The compositions of the chapel Poggi, in St. Giacomo, where the imitation of Michael Angelo is blended with that of Raphael, Corregio, and D. da Volterra, contain the rudiments of their own system.

Pellegrino Tibaldi is more known by his works in fresco than by his pictures in oil, which are extremely scarce: one of the earliest is the Nativity, already mentioned, in the Palace Borgheze, of which the cartoon still exists in a private collection of drawings. It is painted in a sober unaffected tone, and considered as the work of an artist jealous of his line, with great mellowness of touch. The figures of this are considerably less than the size of life; but there are pic-

tures of his to be met with of diminutive dimensions, with all the finish of miniatures, though rich in figures, touched with great spirit and equal vivacity of colour: they are generally let off by backgrounds drawn from his favourite branch of art, architecture. Fuseli's Pilkington.

TIBARANIA, or TIBARĒNIA, in *Ancient Geography*, a country of Asia, in Pontus, in the vicinity of Cappadocia, and adjoining the country of the Chalybes. Steph. Byz.

TIBERIA, a town of Thrace, founded by the emperor Tiberius, whence its name.

TIBERICUM, a town of Italy, near Ravenna.—Also, a town of Lower Germany, upon the route from Colonia Trajana to Colonia Agrippina, between this latter place and Juliacum, according to the Itinerary of Antonine.

TIBERIADES WATER, the water of a hot spring near Tiberiades in Egypt.

Dr. Perry, when on the spot, tried some experiments on this water, which give us a much better idea of its nature than we have from any other accounts of it. Half a drachm of oil of tartar being mixed with an ounce and half of the water, it becomes turbid and muddy; and after twelve hours, three parts of the whole appear like white wool, only leaving a small portion of clear water at the top. The white woolly matter dried, produced only a small quantity of yellow ochre.

Spirit of vitriol added to the water in the same quantity, affords a large unctuous sediment of a white colour. A solution of sublimate being mixed in the same quantity, it became turbid and yellowish, and yielded an earthy sediment in small quantity; whence it seems evident, that it contains a sal murale. Saccharum saturni being added in the same quantity, the water deposited a lateritious sediment in a small quantity. Mixt with spirit of sal ammoniac, it turns to a blueish-green turbid liquor, and finally yields a woolly sediment. Sugar of violets mixed with it, turned it to a yellow colour; and the scrapings of galls mixed with it, turned it to a deep purple; and on shaking, this became as black as ink.

It appears from these experiments, that the water contains a good deal of a gross fixed vitriolic salt, some alum, and a sal murale. It is too salt and nauseous for internal use; but it must be of use as a bath in all cutaneous foulnesses, especially in scorbutic and leprous cases; for it will powerfully deterge, scour, and cleanse the excretory pores, and it may be, by its weight and stimulus, restore them to their natural state and tone, and restore the true state of the vitiated solids in general. Phil. Trans. N<sup>o</sup> 462. p. 52.

TIBERIANI CAMPI, in *Ancient Geography*, fields of Italy, in the vicinity of Rome, which took their name from the emperor Tiberius, who fixed them at 25 acres.

TIBERIAS, a town of Palestine, the capital of Galilee, was situated in a plain, near the lake of Gennesareth, which from this city was also called the lake or sea of Tiberias. This city is very famous, and often mentioned by Jewish writers, because, after the taking of Jerusalem, there was at Tiberias a succession of Hebrew judges and doctors till the fourth century. It was a bishop's see in this century. Epiphanius says that a Hebrew translation of St. John, and the Acts of the Apostles, was kept in this city. It was distant about 90 miles from Jerusalem. See TABARIA.

TIBERINA INSULA, the isle of Tiber, situated in the city of Rome; called by Suetonius the isle of Æsculapius. Plutarch says that this island was called at Rome the sacred isle and the isle of two bridges, because in consecrating to Mars a field which belonged to the Tarquins, they threw into

the

the river the corn and also the trees which grew in this field. These materials, united with the mud brought down by the river, formed an island, on which were built several temples and porticoes.

**TIBERINA Regio**, a country of Asia, in Cappadocia, where was a place named Ariarzus.

**TIBERIOPOLIS**, a town of Asia, in Phrygia Major. Ptol.—Also, a town of Bulgaria, upon the coast of the Euxine sea.

**TIBERIS**, or **TIBER**, a river of Italy, which had its source in the Apennines, towards a place called Tifernum Tibarinum. Its course was first towards the S. passing by Perugia, as far as Tuder, where it turned towards the S.W. as far as the Volturni. Having received the Clanis, it turned towards the S.E., received the Nar at Hortanum, and continued in this direction as far as a point that lies between Capena and Cures. Assuming a direction towards the S., it passed to Rome, and then proceeded towards the S.W. to the sea before Ostia, *i. e.* the mouths, of which it has many. This river was inconsiderable till it reached Hortanum; but afterwards it was augmented by the Nar, the Valinus, and the Anio, so that at Rome it was large and deep. The ancients, by way of enhancing its celebrity, represent it as receiving twenty other rivers; but under this general denomination they must comprehend several small streams. It was called by various names.

**TIBERIUS CLAUDIUS NERO**, in *Biography*, a Roman emperor, so called after his father, his mother's name being Livia Drusilla, was born in the year B.C. 42. He was at an early age so well instructed in Greek and Roman literature, as to be able, when nine years old, to pronounce a funeral oration for his father, which gained great applause. His temper was naturally reserved and gloomy, and yet, with the advice of his mother Livia, who was married to Augustus, he conducted the usual spectacles with a magnificence which gave satisfaction to the Roman people. His first appearance in a military character was as a tribune in the Cantabrian war; he next sustained the office of commander-in-chief in placing Tigranes on the Armenian throne, and on his return was made prætor. He was afterwards sent to join his brother Drusus, and gained a decisive victory over the Rhetians and Vindelicians. He became consul in the twenty-eighth year of his age, and thus rapidly advanced to the rank which, as the emperor's step-son, he was likely to obtain, and his elevation was accelerated by the death of Agrippa, B.C. 22. Previously to his being admitted into a partnership of the empire, Augustus obliged him to divorce his wife Vipsania, the daughter of Agrippa, and the object of his choice and affection, and to marry his own daughter Julia, of doubtful reputation.

The next object of his military career was the reduction of the Pannonians, in consequence of which he was honoured with triumphal ornaments. From his successful prosecution of the war in this part of the empire he was suddenly called to attend his brother Drusus in his last moments: and he afterwards accompanied his remains on foot in a funeral procession to Italy. After his victories had been celebrated by an ovation, he was deputed to make peace in Germany, and being a second time made consul, B.C. 7, he triumphed on the day when he took possession of his dignity. At the expiration of the year, Augustus conferred upon him the tribunitian power for five years. At this time Caius, one of the emperor's adoptive sons, though under age, was raised to the pontificate, and introduced into the senate. Jealous of Caius as a rival, and disgusted by the open gallantries of his wife Julia, he resolved to ask permission to withdraw from public business, and to live in retirement at the

island of Rhodes. Accordingly he sailed for Rhodes. His wife's conduct became so notorious, that she was banished by her father to the isle of Pandataria, and divorced from her husband. Having obtained leave of the emperor, though reluctantly granted, to return from Rhodes to Rome, he lived privately till the death of the two Cæsars, Caius and Lucius, opened to him new prospects. The emperor, whose declining age needed an associate, adopted Tiberius A.D. 4, renewing his tribunitian power, and then placing him next to himself in the empire. Having brought the war against the Pannonians and Dalmatians, as much by policy as by force, to an honourable termination, he obtained a triumph, A.D. 9; and as a recompence of other services, his tribunitian authority was prolonged: but the emperor terminating his life at Nola, Tiberius, without opposition, succeeded to the empire, in the fifty-fifth year of his age. Past experience had taught him the art of dissimulation, and this art he practised during the progress of his reign. Although he was very jealous of his authority, he was moderate in the exercise of it, and always paid great deference to the senate, and respect to the consuls. He was zealous in the administration of justice, and avoided oppressive imposts even in the most distant provinces, for which he had the less occasion, as he was not avaricious of money; a virtue which, as Tacitus says, he retained, when he had renounced all others. To which we may add, that he was munificent in his relief of public calamity and private distresses. These qualities, combined with his sound sense, rendered the earlier part of his reign as prosperous as perhaps any in the annals of the empire.

The popularity of Germanicus rendered Tiberius jealous, and vigilant of his conduct; and in order to restrain his authority, he employed Piso, a man of ancient family and imperious spirit, as his subordinate agent for this purpose. Germanicus, however, died of a lingering disease, and Piso was suspected, if not accused, of having given him poison. Piso was impeached in the senate for his conduct towards Germanicus. In the course of his trial, Tiberius acted with apparent impartiality; but the accused, despairing of an acquittal, put an end to his own life. Tiberius, in the seventh year of his reign, withdrew from Rome to Campania, in order to accusom Drusus, who was then consul, to the exercise of the supreme power. Notwithstanding several instances, in which he manifested a moderate exercise of power, a stern unfeeling tyranny was becoming the settled character of his reign, to which his growing confidence in the detestable Sejanus very much contributed. The death of Drusus, A.D. 23, occasioned by poison, administered in consequence of the seduction of his wife, was borne by his father Tiberius with a degree of self-possession, which was imputed to want of natural affection. After this event he appeared in the senate: and the two elder sons of Germanicus were presented to him. Taking them by the hand, and delivering a speech which melted the whole assembly into tears, he recommended these orphans, who had lost both their uncle and father, to the guardianship of the senate. Two years after the death of Drusus, Tiberius took an opportunity, which a proposal for erecting a temple to him and his mother afforded him, of giving his sentiments on that dedication which disgraced the reigns of the Roman emperors. Recognizing himself as a mere mortal, subject to all the infirmities of the human condition, and sufficiently honoured in holding the first place among men, he was desirous that posterity should know his sentiments on the subject, and that he wished for no other honours paid to his memory than to be thought to have worthily performed the duties of his station. The whole speech, replete with wisdom

dom and good sense, is reported by Tacitus. His design of retiring from the capital, encouraged for selfish purposes by Sejanus, was put into execution A.D. 26. Accordingly he withdrew into the isle of Capreae, near the bay of Naples. Here he passed his remaining years, immersed in gross and infamous debauchery, hating mankind, scarcely known to exist but by his cruelties, and rendering himself, in direct opposition to his own maxims, "let them hate, provided they esteem me," no less contemptible than odious. It ought to be mentioned, however, that in a conflagration which consumed a large quarter of Rome, he displayed a very laudable and spontaneous munificence. For an account of his connection with Sejanus, and of the effects and termination of that connection, we refer to the article SEJANUS. The latter part of Tiberius's reign was marked by fervility on one hand, and despotic ferocity on the other; and it appears by one of his letters to the senate, that he suffered as much misery from the anguish of self-reproach and tumult of mind as he inflicted: "What I shall write to you, conscript fathers, or what I shall not write, or why I should write at all at this time, may the gods and goddesses plague me more than I feel daily that they are doing, if I can tell!" What mental torture it must have been, says Tacitus, that could have extorted such a confession. Some few occasional acts of wisdom and munificence brightened in a faint degree the black picture that was exhibited by his general conduct. Towards the close of life, and at an advanced age, the appointment of a successor engaged his attention. He had two alternatives; the one was the nomination of Caius, his grandson, the son of Germanicus, who was his adopted son; and the other, the appointment of Gemellus, the son of Drusus, who was his son by nature. The former was of mature age, being now twenty-five, and possessed of popular favour. The dissimulation of this aspirant to the empire had not eluded the penetration of Tiberius. See CALIGULA.

Tiberius, leaving Capreae, frequently changed his abode, and at last stopped at a country-house, which had belonged to Lucullus, near the promontory of Misenum. There, on March 16th, A.D. 37, he sunk into a state, in which he appeared dead; upon which Caius, with indecorous precipitance, proceeded with a numerous escort to seize possession of the empire: but his revival threw them all into confusion. At this instant Macro, the pretorian prefect, caused him to be suffocated with pillows. He died in the seventy-eighth year of his age, and twenty-third of his reign, universally execrated; and his predominant vices were such, that they have almost effaced the records of his laudable qualities. Tacitus. Suetonius. Crevier.

TIBERIUS CONSTANTINE, emperor of the East, was a Thracian by birth, and by office captain of the guards to Justin II. By the recommendation of the empress Sophia, he was raised to the rank of Cæsar A.D. 574, and in 578, when Justin died, succeeded to the imperial throne. Sophia, attached to his person, had flattered herself with the hope of his being her second husband; but on his accession to the empire, it appeared that he had been previously married to Anastasia, who was proclaimed Augusta. Sophia, thus disappointed, concurred in a conspiracy for raising to the purple Justinian, commander of the eastern army; but the plot being discovered, Sophia was punished by losing the greatest part of her allowance. The government of Tiberius has been favourably represented. He was temperate, just, and humane; economical in the disbursement of the revenue, yet liberal and beneficent, and ready to remit the dues of taxation to sufferers under public calamity. The principal events of his reign were two victories over the Per-

sians. Soon after the second victory, Tiberius fell into a disease, during which he declared Maurice, who had married his daughter Constantia, and who had been nominated Cæsar, his successor: and after a reign of four years, he closed his life in 582, with the general regret of his subjects. Anc. Un. Hist. Gibbon's Rom. Emp.

TIBESTI, in *Geography*, a town of Africa, on the route from Fezzan to Bornou, inhabited by the people called *Tibbo* (which see); 150 miles S.E. of Mourzonk. The vales of Tibesti are fertile in corn, and pasturage for cattle, of which they have numerous herds; and they are particularly celebrated for their breed of camels, which are esteemed the best in Africa. For this fertility they are indebted to the water of the innumerable springs, that amply compensate for the want of rain, which seldom, if ever, falls within the limits of Tibesti. Among the natives of Tibesti, different religions are professed; for some of them are Mahometans, and others continue attached to their ancient system of idolatry. From the plain, which lies to the W. of the desert of Tibesti, a part of the mountains of Tibesti take their rise. These vast hills, the range of which is very extensive, are variously peopled: but such of them as are crossed on the route from Fezzan to the city of Bornou, are inhabited by a mixture of Musulmen and idolaters, who employ themselves in breeding camels and asses, and other cattle, particularly horses of a small size.

TIBET. See THIBET.

TIBI, a town of Arabia, in the country of Oman; 8 miles N. of Kalhat.

TIBIA, in *Anatomy*, the large bone of the leg. See EXTREMITIES.

TIBIA, *Fractures of the*. See FRACTURE.

TIBIA *Biceps*. See BICEPS.

TIBIA, in *Music*, was originally a flute, made of the flank or shin-bone of an animal; and when the art of boring flutes was discovered, they were made of box-tree, laurel, brass, silver, and even of gold. See FLUTE.

TIBIA *Articularis*. See BAGPIPE.

Dr. Burney (*Hist. Mus.* vol. i. p. 521.) apprehends that the union of this instrument with the syrinx suggested the first idea of an organ.

TIBIÆ *Pares et Impares*, in the *Dramatic Music of the Ancients*. It has been long doubted, whether *pares* and *impares* meant double and single flutes, or equal and unequal in point of length and size. But though in preferring either of these acceptations, some sense and meaning is acquired, yet we should incline to the latter. For in none of the representations in ancient painting or sculpture, which we have yet seen, does it appear that the tibiæ, either at sacrifices or in the theatre, plays on a single flute, though we as often see double flutes of different lengths in his hands, as of the same length; and as harmony, or music in different parts, does not appear to have been practised by the ancients, the flutes of equal length may naturally be supposed to imply unisons; and *unequal*, such as are octaves to each other.

TIBIALIA, among the Romans, a kind of swaths with which they used to cover their legs.

TIBIALIS, in *Anatomy*, a name applied to various organs situated in the neighbourhood of the tibia. There is an anterior and a posterior tibial artery, an anterior and posterior tibial nerve (see ARTERY and NERVE), and the two following muscles.

TIBIALIS *Anticus*, jambier antérieur, tibio-fus-tarsien; an elongated muscle, flattened at the sides, placed on the front of the leg, and extending from the upper end of the tibia to the first cuneiform bone. It is covered in front by the

the aponeurosis of the leg, to which it adheres closely at the upper part: the anterior surface of the muscle forms the convexity on the outside of the tibia, which is more considerable in strong muscular subjects. The inner flat surface corresponds to the outer or concave surface of the tibia, and is attached to its upper half: the outer surface corresponds above to the extensor longus digitorum pedis, below, to the extensor longus pollicis pedis: the anterior tibial vessels and nerve being interposed. The posterior edge of the muscle is attached to the upper three-fourths of the interosseous ligament, then it lies on the front of the tibia, on the ankle joints, and on the upper and inner part of the tarsus. The upper extremity of the muscle is fixed to the front of the external tuberosity of the tibia; thence it descends parallel to the tibia, first increasing in size, then diminishing again, and ending about the lower third of the leg in a thick and flat tendon, which descends over the front of the tibia, and of the ankle, confined by the superior annular ligament of the tarsus. (See FASCIA.) Having passed this ligament, the tendon passes forwards on the foot, then turns obliquely inwards, becoming a little broader, over the convexity of the first cuneiform bone, and divides into two portions. The posterior, which is the largest, is fixed to the inner and front part of the basis of that bone; the anterior and smaller is attached to the posterior extremity of the first metatarsal bone.

The lower part of the tibialis anticus consists of a strong tendon, which enters the substance of the muscle, and expands into an aponeurosis reaching nearly to the upper end of the muscle. The fleshy fibres arise from the fascia of the leg, from the external surface of the tibia, from the interosseous ligament, and from an aponeurotic septum between it and the extensor longus digitorum. They pass obliquely to both surfaces of the tendon, like the barbs on the shaft of a feather, and are continued much lower on its posterior than on the anterior surface.

It bends the foot on the leg, and turns the point inwards: it elevates at the same time the whole internal edge of the foot. It brings the leg forwards on the foot, and maintains it in that position.

*TIBIALIS Posterior*, jambier postérieur, tibio-sous-tarsien, is a long narrow muscle, thicker above than below, placed at the back of the leg, under the calf, and extending from the upper part of the tibia and fibula to the os naviculare. It is covered behind by the soleus, by the flexor longus digitorum and pollicis pedis. In front it is attached to nearly the whole posterior surface of the interosseous ligament, and above, to the posterior surface of the tibia. On the outside it is fixed to the fibula. Its upper extremity is divided into two portions, an external and smaller attached to the fibula, an internal larger to the tibia and interosseous ligament; they are separated by an interval, through which the anterior tibial artery passes. The muscle descends parallel to the bones of the leg, and arcuated between them, becoming larger to its middle, from which it again diminishes; towards the lower part of the leg it forms a strong tendon, which runs in a groove hollowed in the external malleolus, and surrounded by a fibrous sheath, which separates it from the flexor longus digitorum. In this groove the tendon becomes broader: it passes below the head of the astragalus, swelling into a hard and nearly bony substance, and is attached to the lower and inner part of the os naviculare, and to the basis of the first cuneiform bone. The inferior tendon ascends into the muscle, expanding into an aponeurosis, in which the fleshy fibres are inserted obliquely on all sides from the fibula, the tibia, the interosseous ligament, and the aponeurosis, which covers it

from the flexor longus digitorum. It extends the foot on the leg, turning the sole and point a little inwards. It will carry the leg backwards on the foot, when that is fixed.

*TIBICEN*, in *Ancient Music*, a flute-player.

*TIBICEN*, in *Ichthyology*, a fish of the *trigla* kind, called by many authors *lyra*, or the *harp-fish*; and in some parts of England, the *piper*.

The head of this fish runs out into two broad horns, which are serrated, or beset with a sort of teeth, or small spines, all along their edges, which is its principal distinction from the hirundo or swallow-fish. Above the gill-fins it has on each side a long and sharp spine. The forehead is elevated into a sort of eye-brow over the eyes: and at the angles of these there are small and short spines, which are long and crooked. The side lines feel but very little rough to the touch, and the forehead between the eyes is not hollowed. The whole head is covered with a bony crust, which runs into two horns or spines behind. It has three fingers or filaments on each side, from the roots of the gill-fins; and its jaws are rough like files, but have no distinct teeth. The tail-fin, and the middle of the back, in this fish, are red. It is caught in the Mediterranean, and in some other seas. In our county of Cornwall it is not unfrequently caught about the shores, and from the noise it makes, when taken out of the water, is called the *piper*. Ray and Willughby.

*TIBIGENSE OPPIDUM*, in *Ancient Geography*, a town of Africa Propria, according to Pliny; called Thigiba by Ptolemy.

*TIBIGI*, in *Geography*, one of the rivers of the Brazils, which flow into the Parana, rich in diamonds, as the few families that live in its vicinity have reason to remember with gratitude. West of this river and of Corritiva, it is dangerous to land, since in that direction are found the Anthropophagi, who were driven from these boundaries at a very recent period. The country to the N. abounds with wood.

*TIBILIS*, in *Ancient Geography*, a place of Africa, distant to leagues S.W. from Hippo Regius, and 16 miles E. of Cirta; where are many ruins.

*TIBISCA*, a town of Lower Mæsia. Ptol.

*TIBISCUM*, one of the most considerable towns of Dacia. Ptol.

*TIBISCUS*, a river of Dacia, which ran into the Danube.

*TIBISIS*, a large river, which rose in mount Hæmus, and pursuing a north course, discharged itself into the Ister.

*TIBIUM*, a mountain of Asia, in Phrygia.

*TIBOELALE*, in *Geography*, a town on the S. coast of the island of Ceram. S. lat. 3° 19'. E. long. 128° 45'.

*TIBOUCHINA*, in *Botany*, an unexplained barbarous name, Aubl. Guian. 445. t. 177. Juss. 329. The shrub which bears it is suspected by Schreber to be a species of *MELASTOMA*. (See that article.) We see no reason to question this, though Aublet describes the fruit as a dry capsule; for the known *Melastoma* differ greatly in the degree of pulp in their berries, especially according to the period at which they are examined.

*TIBOULEN*, in *Geography*, a small island in the Mediterranean, near the coast of France. N. lat. 43° 15'. E. long. 6° 24'.

*TIBOURBOU*, in *Botany*, the Caribbean name of a fine tree of Guiana and Cayenne, called *Apeiba Tibourbou* in Aubl. Guian. 538. t. 213. See *AUBLETIA* and *SLOANEA*.

**TIBRACANA**, in *Ancient Geography*, a town of Asia, in the interior of Media. Ptol.

**TIBULA**, or **TIBULÆ**, a town situated on the northern coast of the island of Sardinia. Ptol. Iter. Anton.

**TIBULLUS, ALBIUS**, in *Biography*, a Roman poet of the Augustan age, of the equestrian rank, whose native place and time of birth are not ascertained. His patrimony was much impaired, either by his own prodigality, or by the devastation of several wars; but yet he does not seem to have been distinguished by any tokens of the liberality of Augustus and Mæcenæ, the munificent patrons of literature at the period in which he lived; nor does he mention their names in any of his poems. M. Valerius Messala Corvinus, upon whom he composed a panegyric, was his particular friend and patron, whom he accompanied in his expeditions to Asia; but he preferred peace and retirement in the society of one of those objects of his affection whom he has celebrated in his elegies. Horace, with whom he was intimate, has addressed to him an ode and an epistle, complimenting him as a candid judge of his writings, and describing him as possessed of every worldly advantage. It has been inferred, from an epigram of Domitius Marfus, that he died about the same time with Virgil, B.C. 19, in the flower of his age. Ovid lamented his death in a beautiful elegy, representing his mother and sister as mourners at his funeral, and speaking of him as a poet of the highest reputation.

The poems of Tibullus are elegies comprised in three books, and a panegyric of Messala. His fame is founded on his elegies, which are described by one of his biographers as occupying, by the testimony of ancient and modern critics, the first class of such compositions with regard to "the appropriate qualities of elegance, tenderness, and that beautiful simplicity, which is the character of real feeling." Their principal subjects are "love and rural life." With his description of a passion which is illicit, he has blended "more touches of a pure, and what may be termed a conjugal affection, than almost any other Roman poet. His language is a true example of what the Latins call *terse*, or neat and polished. He is easy and natural, with scarcely any mixture of learned allusion or figure." His works are usually printed with those of Catullus and Propertius; but of the separate editions, the most esteemed are those of Brookhusius, Amst. 1708, 4to.; of Vulpius, Patav. 1749, 4to.; and of Heyne, Lips. 1755, 1777, 8vo. Gen. Biog.

**TIBUR, TIVOLI**, in *Ancient Geography*, a town of Italy, near the Anio, N.E. of Rome, in the country of the Sabines. Pliny refers its origin to the age which preceded the siege of Troy, and says that its founder was Tiburnus, one of the sons of Amphiaris, assisted by his two brothers, Catille and Corax. This Tiburnus was regarded after his death as a god; and was worshipped in a wood consecrated to him, and where a temple was erected to his honour. But Dionysius Halicarnassensis pretends that it was built by the Siculi, before this epocha. For its situation, and some other circumstances attending it, we refer to the article **TIVOLI**.

Horace has described in a few lines the beauties which he admired in contemplating this ancient city, Od. 7. lib. i. "Nothing," says the poet, "struck me so much as the house of the resounding Albunea, the lofty cascade of the Anio, the sacred wood of Tiburnus, and the gardens irrigated by unintermitting supplies of water." The "domus Albunæ resonantis" of the poet was the solfatara or sulphureous abyss of the place, probably the crater of some ancient volcano, which perpetually discharged a kind of gas or

mephitic vapour, that was thought to possess a sanative quality, and to be a remedy for many disorders. Many persons resorted hither for relief; and Suetonius informs us, that Augustus also came for the benefit of the baths which the place afforded. These benefits were ascribed to imaginary deities, who were thought to preside over this privileged spot. Accordingly, a monument has been discovered, which indicated that Hygeia, the goddess of health, was worshipped here. The vapour possessed also a kind of inspiring quality, so that here was a temple of the Muses; and also, besides various other monuments, a temple in which was an oracle. Virgil informs us how this oracle was consulted. The "præceps Anio" of Horace refers to the cascade of this river. The gardens and vineyards have to this day retained their celebrity; the wine of this canton being held in high estimation.

Tibur was also famous for its temple of Hercules, which had its college of priests and curator; a beautiful portico, where, according to Suetonius, Augustus administered justice when he resided here; and an excellent library of which Aulus Gellius speaks in his "Noctes Atticæ." Tibur had also a temple of the Sibyl, much admired for its elegance. This place was also famous for other monuments, now in ruins. Towards the end of the Roman republic, the adjoining territory was selected for superb buildings and houses of various kinds, all distinguished by their magnificence and beauty. Of these, the Tiburnus of Adrian was the most celebrated.

**TIBURO**, in *Ichthyology*, a fish very badly and falsely described by several authors, and proving, on a strict inquiry, to be no other than the lamia or white shark.

The tiburo of Linnæus is a species of squalus, with a very broad and heart-shaped head, found in the American seas. Linnæus queries, whether it is not a variety of the *xygæna*, or hammer-headed shark.

**TIBURON**, in *Geography*, a town and bay on the S.W. coast of Hispaniola, near Cape Tiburon.—Also, a small island in the Pacific ocean, discovered by Magellan in 1520. It is variously laid down in maps. S. lat. 9°, 13°, 14°, 15°, and 17°.

**TIBURONES**, or *Main Cape Reef*, two small islands, surrounded with rocks, near the coast of Honduras. N. lat. 15° 10'. W. long. 82° 8'.

**TICADEE**, a town of Hindoostan, in the circar of Ruttunpour; 15 miles N. of Dumdah.

**TICAL**, in *Commerce*, a weight for gold and silver, and also a money of account in certain parts of the East Indies, particularly at Pegu and Siam. At Pegu, the weight of silver, under this denomination, is divided into 16 toques or touch. Gold and silver are here weighed by the tical, and their fineness is expressed by the parts called touch. The tical weighs  $4\frac{1}{2}$  pagodas, or  $237\frac{1}{2}$  English grains. The commercial weights are the vis of 100 ticals or tuals, and the candy of 100 vis. From the above weight of the tical, the candy should weigh  $508\frac{1}{2}$  lbs.; nevertheless the English reckon it at 6 maunds 28 seers of the Bengal factory, or 500 lbs. avoirdupois.

At Siam, the accounts are kept in cattles, tales, ticals or tuals, miams, fouangs, and cowries. The catty is = 20 tales, the tale = 4 ticals = 16 miams = 32 fouangs; and the fouang is = 800 cowries. The coins are gold ticals, which pass for ten silver ticals; silver ticals, miams, fouangs, and somepiais, the latter being the fourth part of a fouang. The silver tical weighs  $225\frac{1}{2}$  English grains, and being from 11 oz. 4 dwt. to 11 oz. 12 dwt. fine, is worth from 29d. to 30d. sterling; but these coins are often adulterated; 2 ticals pass commonly for 1 Spanish dollar, and  $2\frac{1}{2}$  ticals for 1 Dutch

1 Dutch ducatoon. The fineness of gold and silver is expressed by toques or touch, the weight being divided into 100 parts. The pecul, or weight for heavy goods, is = 50 cattles, and the catty = 20 tales = 80 ticals. The Siam pecul weighs 129 lbs. avoirdupois, and the catty, 41 oz.  $\frac{1}{2}$  dwt. avoirdupois.

TICANONA, TACONA, *Jeanona* or *Jeatona*, in *Ancient Geography*, a town of Egypt, between Cene and Oxyrynchon. Itin. Anton.

TICAO, in *Geography*, one of the Philippine islands, about 25 miles long, and from 3 to 8 broad. N. lat.  $12^{\circ} 39'$ . E. long.  $123^{\circ} 34'$ .

TICENA, in *Ancient Geography*, a town of Africa Propria, S. of Carthage, between the rivers Bagradas and Triton, Ptol.

TICENGO, in *Geography*, a town of Italy, in the department of the Upper Po; 6 miles E. of Crema.

TICHASA, TE-GEWSE, in *Ancient Geography*, a town of Africa Propria, S. of Carthage, between the rivers Bagradas and Triton, 12 leagues S.W. of Capfa: in which are some vestiges of the Romans. Ptol.

TICHENBRAY, in *Geography*. See TINCHEBRAY.

TICHFIELD, a village of England, in the county of Hants, situated on a river which runs into the Southampton Water. Here Charles I. concealed himself, when he fled from Hampton-Court, in the year 1674, at a feat of the earl of Southampton. This feat had been an abbey, and is said to be the place where the marriage of Henry VI. with Margaret of Anjou was solemnized; 8 miles N.W. of Gosport.—Also, a town of Jamaica, on the N. coast; 22 miles N.E. of Kingston. N. lat.  $18^{\circ} 12'$ . W. long.  $76^{\circ} 10'$ .

TICHIS, in *Ancient Geography*, a river which flowed from the Pyrenees, now *Tech*, in the department of the Eastern Pyrenees.

TICHIUM, a town of Greece, in Etolia. Thucydides.

TICHOS, or TICHUS, a fortress of Achaia, in the eastern part to the S. of the promontory Araxum.

TICINDLO, or *Naviglio Grande*, in *Geography*, a canal made from the river Tesino to the city of Milan, by order of Francis I. king of France.

TICINUM, PAVIA, in *Ancient Geography*, a town of Transpadane Gaul to the S.W. upon the river Ticinus, or near it. After the second Punic war, it attained the rank of municipal. Odoacer, king of the Heruli, destroyed it, and it was rebuilt under the name of Pavia, whence the name Pavia.

TICINUS, TESIN, a river of Transpadane Gaul, which commenced in the country of the Lepontii, traversed the lake Verbanus, and discharged itself into the Po, near Ticinum. It is celebrated for a battle of the same name, between the Romans, conducted by Cornelius Scipio, the father of Scipio Africanus, and the Carthaginians, conducted by Hannibal, in the year of Rome 535, in which the Romans were defeated.

TICK, in *Natural History*, a nasty little animal of a livid colour, with a blunt and roundish tail, elevated antennæ, a globose-ovate form, and full of blood; which infests cows, swine, goats, sheep, and dogs. The tick or ricinus is, in the Linnæan system, a species of *acarus* in the *aptera* order of insects.

In order to destroy and remove these noxious vermin, which spread very rapidly in sheep, it has been recommended to separate the wool, and to wash the diseased spots two or three times, or oftener, if necessary, with a liquid preparation, consisting of one ounce of cream of tartar, and a

quarter of a pound of bay-salt, each finely powdered and sifted, and one ounce of corrosive sublimate, reduced into the same state; the whole being well dissolved and mixed together in two quarts of soft water: or four pounds of soft soap, and two pounds of arsenic, may be steeped and dissolved in thirty gallons of water, and the animals be immersed in the infusion or solution, the heads of them being carefully kept above water, and the sheep being sheltered from rain for one or two days afterwards. The wool must be closely pressed, and the liquor that runs off be caught in a tub, or other vessel, for future use. The proportion above specified, is sufficient to bathe or wash forty lambs, or the same number of small sheep; and sometimes many more.

But the preparation which is in use at Holkham-Hall, in the county of Norfolk, for this purpose, consists of two pounds of tobacco, two pounds and a half of soft soap, and one pound of the white calx of mercury, well reduced into powder; the whole being boiled in eight gallons of water for an hour. This is a quantity sufficient for dressing sixty sheep, being applied by parting the wool down the shoulders and breast, and twice on each of the sides of the sheep, then pouring it in very carefully so as to prevent its being wasted. It is said to be very effectual not only in destroying the vermin, but in removing the scabby sores that are produced.

It is stated in a paper in the third volume of the "Transactions of the Highland Society of Scotland," that the tick, or *acarus reduvius*, is a distinct species or sort of vermin of this kind from that of the kid, or *hippobosca ovina*, the former of which harasses the lambs and trembling sheep in the spring season, while the latter molests all sorts and ages, but particularly hogs or young sheep, and chiefly such as are in a lean state. The former always adheres close to the bare spots of the shoulders, thighs, or ears, draining and drawing away the blood from them; and for the most part drops off about midsummer: but the latter harbours in the wool, bites the sheep, and sucks their blood. Smearing with tar, it is said, expels it from the skin, and it soon afterwards drops from the wool. Tobacco-juice is fatal to it almost instantaneously, and mercurial ointment destroys it. The former, or tick, is removed by the same remedies as the kid, and it is wholly prevented by having the young sheep in good condition. This distinction, in some cases, may be of considerable use to the sheep-farmer in the destruction and removal of such hurtful vermin.

TICK, in the *Manege*, a habit that some horses take of pressing their teeth against the manger, or all along the halter or collar, as if they would bite it.

TICK-Bean, or Ticks, in *Agriculture*, a term commonly applied to the small bean employed in the feeding of horses and other animals; of which there are several kinds, as the common ticks, the large flat ticks, the small or Essex ticks, and the French ticks. The first is a sort which is small and very commonly cultivated, but most generally by the farmers of Kent, where they are used for the fattening of hogs, and as food for horses, especially those of the team kind. The second is a larger sort than the common, and ripens somewhat more early. They are very productive in some cases; but from being larger in size, they of course are less heavy, and consequently of rather less value the quarter or any other measure. They are sometimes called May beans. The Essex ticks are a much smaller sort than the common, and of a rounder shape or form. They ripen a few days later, and are not so productive, but are more valuable, as being heavier in proportion. The last sort, or small French ticks, are a still less kind, being only about as large as a middling-sized pea, and nearly circular. They ripen later than

than any of the other sorts, but are the most valuable when dry, on account of their great weight.

Ticks are an important article of cultivation in most places, where the land is suited to their growth; and though they have been for a long time, and are at present, almost wholly confined to the counties of Essex and Kent, they may be raised in many other districts with equal success and advantage.

TICKARRY, in *Geography*, a town of Hindoostan, in Bahar; 15 miles N.W. of Gaya. N. lat.  $24^{\circ} 58'$ . E. long.  $85^{\circ}$ .

TICKELL, THOMAS, in *Biography*, an English poet, was the son of a clergyman in Cumberland, and born at Bridekirk, near Carlisle, in the year 1686. He was admitted at Queen's college, Oxford, in 1701; and in 1707 he published a poem, entitled "Oxford," and inscribed it to lord Lonfdale, expressing his gratitude to that university. In 1708 he took his degree of M.A., and two years after was elected a fellow of his college, under a dispensation from the crown against the statute which required him to be in orders. With a view of advancement by the exercise of his literary talents, he came to the metropolis, and ingratiated himself with Addison by an elegant copy of verses in praise of his opera of Rosamond. He contributed to the periodical publications of the "Spectator" and "Guardian," in the latter of which, all the papers on pastoral poetry, except one by Pope, are ascribed to him. During the negotiations which terminated in the peace of Utrecht, he published a very popular poem, entitled "The Prospect of Peace," which was highly commended by Addison, in return for which commendation he wrote his lines on the "Cato" of that author. On the accession of the Hanover family, to which he was attached, he presented George I. on his arrival with a piece called "The Royal Progress;" and he served the cause still more effectually by two satirical poems on the Jacobite party, viz. "An Imitation of the Prophecy of Nereus," and "An Epistle from a Lady in England to a Gentleman at Avignon." Tickell accompanied Addison to Ireland, and was there initiated in public business with a view to future preferment. On occasion of Pope's publication of the first volume of his translation of Homer's Iliad, Tickell published a translation of the first book of that poem, which was patronised by Addison, so as to occasion an interruption of his friendship with Pope. When Addison was made secretary of state, Tickell was under-secretary, and continued in office under his successor Craggs. On the death of Addison, Tickell was entrusted with the charge of publishing his works, to which he prefixed a valuable life of the author. In 1725 he was appointed to the lucrative post of secretary to the lords-justices of Ireland, and retained it till his death, which happened at Bath in 1740. Tickell had been married and left a family.

Tickell is ranked by his biographers among English poets of the second order; equalled by few of his contemporaries in eloquence of diction and harmony of versification, and without lofty flights maintaining a decent elevation by a cultured style, and by just and ingenious thoughts. His funeral poem on Addison is pronounced by Dr. Johnson to be more sublime and elegant than any that is to be found in the whole compass of English literature. His "Ode to the Earl of Sunderland," and his "Colin and Lucy," are highly commended.

Richard Tickell, esq. a grandson of this poet, who was a commissioner of the stamp-office, has been known to the literary world by his "Wreath of Fashion," and especially by an effusion of political art and satire, entitled "Anticipations of the Debates of the House of Commons," 1778.

He died at Hampton Court in 1793. Johnson and Anderson's Lives of the Poets. Gen. Biog.

TICKELY, in *Geography*, a town of Hindoostan, in the circar of Cicacole; 30 miles N.E. of Cicacole. N. lat.  $18^{\circ} 36'$ . E. long.  $84^{\circ} 34'$ .

TICKERA, a paste which is prepared in Fezzan from dates and the meal of Indian corn, and which, whenever they travel, is in great request among the people of Fezzan.

TICKEREE, in *Geography*, a town of Hindoostan, in Oude; 48 miles N.E. of Manickpour.

TICKHILL, a market-town in the lower division of the wapentake of Strafford-and-Tickhill, in the West Riding of the county of York, England; is 4 miles W. from Bawtry, 7 miles S. from Doncaster, and 154 miles N. by W. from London. The houses are placed in a valley, and cover a large space of ground. Some of them are of brick, and others of stone: a few of them are respectable, but the more numerous have only a mean appearance. A market is held on Fridays, but is nearly fallen into disuse. A fair is kept annually for horses, horned cattle, and sheep. The population return of the year 1811, states that Tickhill contained 1508 inhabitants, who occupied 279 houses. The objects most worthy of attention are the church, and the remains of an ancient castle. The former is a spacious edifice, with a lofty and beautiful tower, and from its architecture seems to have been built in the reign of Henry III. The castle, of which nothing now remains but the lofty mound on which the keep formerly stood, with a ditch and part of the walls surrounding the fortrefs, is situated on the south side of the town. An ancient gateway, forming the entrance on the western side, is the most curious part of the ruins. Part of these, with modern repairs and additions, is the seat of the honourable Frederick Lumley. A great part of the ground within the walls is converted into gardens and shrubberies. The steep declivity of the mound is formed into winding walks, leading by a gentle ascent to the summit.

The history of Tickhill prior to the Norman conquest is wholly unknown. It appears to have been one of the forty-nine manors given by the Conqueror to Roger de Busli, who probably erected and resided in the castle. It was afterwards successively held by several noblemen, till Richard II. gave it to his uncle, John of Gaunt, duke of Lancaster, from whom it passed to the crown by the succession of Henry IV. In the year 1644 the castle was regarded as a very strong fortrefs, and was garrisoned for Charles I.; but being surrendered to the parliament, an order was issued that it should be dismantled and rendered untenable. The circular keep was in consequence demolished, but the foundations may still be traced by opening the ground. A royal free chapel or collegiate church was founded in the castle by queen Eleanor, wife of Henry II. It was given by king John to the prebends of the cathedral church of Rouen in Normandy. It was afterwards granted to the prior and convent of Lenton, Nottinghamshire; and in 1504 to the abbot and convent of St. Peter, Westminster. After the dissolution it was given by Edward VI. to Francis, earl of Shrewsbury.

About two miles and a half from Tickhill is Sandbeck, the seat of the earl of Scarborough. The mansion, built by the late earl, is a large and commodious edifice, seated in a spacious park, which abounds with forest trees; and is adorned with an extensive lake. Near the western verge of the park, are the venerable and picturesque ruins of Roche abbey, which was founded in the year 1147, for monks of the Cistercian order. Here is a famous quarry, from which  
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the stone for building the abbey, and for many other public edifices, was obtained.

About five miles nearly S. from Tickhill is Walding Well, the seat of sir Thomas White, bart. The house is a modern edifice, situated in a well-wooded park of considerable extent, and stands partly in Yorkshire and partly in Nottinghamshire; a small rivulet, which runs under a part of the out-buildings, forming the boundary between the two counties. In the park was formerly a priory of nuns, called St. Mary in the Park, founded by Ralph de Cheurolcourt. This religious house appears to have stood within the limits of Nottinghamshire.—*Beauties of England and Wales*, vol. xvi. Yorkshire; by J. Bigland.

TICKING, or TICHING, in *Husbandry*, denotes the act of setting up turfs in such a manner as that they may be dried by the sun, and fit for being burnt into ashes on the land.

TICKLE HARBOUR, in *Geography*, a harbour on the E. coast of Newfoundland.

TICKLE *me Quickly*, a bay on the coast of Darien, near the Samballas.

TICKLISH, in the *Manege*. A horse is said to be ticklish that is too tender upon the spur, and too sensible, that does not freely fly the spurs, but in some measure resists them, throwing himself up when they come near and prick his skin. A ticklish horse has somewhat of the ramingues, *i. e.* the kickers against the spurs; but with this difference, that the latter put back, leap, and kick, and yerk out behind, in disobeying the spurs; whereas a ticklish horse only resists for some time, and afterwards obeys, and goes much better, through the fear of a vigorous ham, when he finds the horseman stretch his leg, than he does upon being actually pricked.

TICKSAH, in *Geography*, a river of America, in the Mississippi territory, which rises 10 miles N.E. of the forks of the Amite, and when it enters West Florida, is a creek of trivial size; it then becomes gradually augmented by several creeks, and after a S. course of 10 miles, falls into lake Maurepas, 4 miles N.E. of the mouth of Amite. Three miles above its mouth the Ticklah receives from the E. the united streams of the Notalbany and Pontchatoola, upon the latter of which stands Springfield, on the road from Madisonville to Natchez. Springfield is one of the landing places of travellers, who pass in schooners from New Orleans to Natchez. The above-mentioned Amite rises within the Mississippi territory, about 20 miles N. of the town of Liberty, in Amite county. The two streams that constitute the Amite, remain separate in their course through the Mississippi territory, but unite immediately on entering West Florida, and then it joins the Iberville, and falls after a whole course of 100 miles into the lake Maurepas. Below the junction of Amite and Iberville, the united streams form a fine navigable river, admitting vessels of six feet draught.

TICKSEED SUN-FLOWER. See COREOPSIS, and SUN-FLOWER.

TICOLEA, in *Geography*, a town of Hindoostan, in Bahar; 7 miles N. of Bettiah. N. lat. 26° 55'. E. long. 84° 38'.

TICOLOOSA, a town of the United States of America, in Tennessee; 38 miles S. of Knoxville.

TICONDEROGA, a township of Essex county, in the state of New York, erected in 1804. It is bounded N. by Crown Point, E. on lake Champlain, S. by Washington county, W. by Scroon, and includes the N. end of lake George. Mount Defiance is in the S. part of this township. In 1810 it had about two hundred families, and thirty-five senatorial electors: seven saw-mills, three grain-

mills, three forges, three carding-engines, and some other machines, and three school-houses. Here is also a broom machine, in which, by means of machinery moved with water, one man makes a hundred brooms a day. The inhabitants are mostly farmers.

In this township stands the fortress of Ticonderoga, now a heap of ruins. It was built by the French in 1756, on a point of land formed by the junction of lake George creek with lake Champlain, in N. lat. 43° 50', and 34' E. long. from New York. It was, both by nature and art, a place of great strength. On three sides it is surrounded by water, and about half the other side is occupied by a deep swamp, and the line of defence was completed by the French with the erection of a breast-work nine feet high, on the only available ground. In 1758, general Abercrombie with the British army unsuccessfully assailed this fortress, and with the loss, as it is said, of 1941 men; but in July of the following year it was surrendered to general Amherst. It was the first fortress carried by the arms of America, in their contest for independence; being taken by surprise by general Allen, May 10, 1775, and retained till July 1777, when it was evacuated at the approach of general Burgoyne with the British army. This fort is never likely to be rebuilt; for the situation is very insecure, being commanded by the lofty hill called Mount Defiance. Mount Independence lies on the E. side of the lake, about two miles S.E. of the fort, between which two places there is a well-regulated ferry. The population of the township, in 1810, consisted of 985 persons.

TICOO, a town on the W. coast of Sumatra, near the Line. E. long. 99° 21'.

TICOO *Islands*, a cluster of small islands near the W. coast of Sumatra. S. lat. 0° 6'. E. long. 99° 13'.

TICORANTE, a town of the island of Teneriffe.

TICOREA, in *Botany*, a name of Aublet's. See OZOPHYLLUM.

TICOS, in *Geography*, a small island in the Pacific ocean, near the E. coast of the island of Luçon. N. lat. 14° 10'. E. long. 124°.

TICOUL HOTUN, a town of Corea; 450 miles E.N.E. of Peking.

TICOUR, a town of France, in the department of the Moselle; 6 miles N.W. of Morhange.

TICSAN, a town of Peru, in the jurisdiction of Cuença.

TICUARIN, the name of the island of Goa, before the city was built.

TICUNAS, *Poison of*, is an active poison prepared by the native Indians, on the borders of the river of the Amazons, in three or four degrees of south latitude, which, together with that of Lamas, Pevas, and Yameos, is extracted by fire from plants, called by the French lianes, and used in poisoning their arrows. See an account of the nature and effects of these poisons by M. Herissant, in Phil. Transf. vol. xlvii. art. 12. and by M. Fontana, in Phil. Transf. vol. lxx. part i. Append. art. 2.; and also Fontana sur les Poisons, &c. Florence, 4to. See also POISON.

TIDE, or TIDI, in *Geography*, a river of England, which passes by St. Germans, and runs into the Hamoaze below Saltash.

TIDE, the same with time, or season. The word is originally Saxon, *tid*; which signifies the same.

TIDE, among *Miners*, denotes the space of twelve hours.

TIDE, *Sbrove*. See SHROVE.

TIDE, *Twelfth*. See TWELFTH.

TIDE, *Whitsun*. See WHITSUN-Tide.

TIDES, two periodical motions of the waters of the sea; called also the *flux and reflux*, or the *ebb and flow*.

When the motion of the water is against the wind, it is called a *windward-tide*: when wind and tide go in the same direction, *leeward-tide*: when it runs very strong, it is called a *tide-gate*.

To *ride it over or up* into any place, is to go in with the tide, either ebb or flood, as long as that lasts; then to stay at anchor all the time of contrary tide; and thus to set in again with the return of the next tide.

It is said to *flow-tide* and *half-tide*, allowing six hours to a tide, when the tide runs three hours in the offing longer than it does by the shore; but, by *longer*, they do not mean its running more hours; but that, if it be high water a-shore at twelve, it will not be so in the offing till three. An hour and a half longer make tide and quarter-tide, three-fourths of an hour longer make tide and half-quarter tide, &c.

When the moon is in the first and third quarter, *i. e.* when she is new and full, the tides are high and swift, and are called *spring-tides*: when she is in the second and last quarter, the tides are lower and slower, and called *neap-tides*.

TIDES, *Phenomena of the*. The sea is observed to flow, for certain hours, from south towards north; in which motion, or *flux*, which lasts about six hours, the sea gradually swells: so that, entering the mouths of rivers, it drives back the river-waters toward their heads, or springs.

After a continual flux of six hours, the sea seems to rest for about a quarter of an hour; after which it begins to ebb or retire back again from north to south, for six hours more; in which time, the water sinking, the rivers resume their natural course. Then, after a seeming pause of a quarter of an hour, the sea again begins to flow, as before; and thus alternately.

Thus does the sea ebb twice a day, and flow as often; but not in the same hours. The period of a flux and reflux is 12 hours 50½ minutes; so that the tides return later and later each day by 50½ minutes, which is the excess of a lunar day above a solar one, since 28½ lunar days are nearly equal 29½ solar ones. So that the sea flows as often as the moon passes the meridian, both the arc above, and that below the horizon; and ebbs as often as she passes the horizon, both the eastern and western point of it.

This farther agreement we observe between the moon and the sea, that the tides, though constant, are not equal; but are greatest, when the moon is in conjunction or opposition to the sun, or at the time of new and full moon; and least, when in quadrature to it. This increase and diminution constitute the *spring* and *neap* tides: the augmentation becomes also still more observable when the moon is in its perigee, or nearest the earth. The lowest as well as the highest water is at the time of the spring-tides: the neap-tides neither rise so high nor fall so low.

Lastly, those tides are the greatest, which happen in the new and full moon, and the time of the equinoxes, while the moon is in its perigee. These tides are often still more increased by the equinoctial winds, which are sometimes so powerful as to produce a greater tide before or after the equinox than that which happens in the usual course, at the time of the equinox itself.

Add, that the same things are observed throughout most of the coasts of Europe; only that the tides are so much the less, and happen the later, as the coasts are the more northerly.

These phenomena of the tides are admirably accounted

for, from the principle of gravitation. All we require to their solution is, that the earth and moon, and every particle of them, mutually gravitate towards each other: the reasonableness of which assumption, see under the article GRAVITY.

Indeed the sagacious Kepler, long ago, conjectured this to be the cause of the tides: "If," says he, "the earth ceased to attract its waters towards itself, all the water in the ocean would rise and flow into the moon: the sphere of the moon's attraction extends to our earth, and draws up the water." Thus thought Kepler, in his *Introductio ad Theor. Mart.* This surmise, for it was then no more, is now abundantly verified in the following theory, first amply deduced by Dr. Halley from the Newtonian principles.

However, we may observe with M. de la Lande (*Astronomie*, vol. iv. Paris, 1781.) that several of the ancients, and among others, Pliny, Ptolemy, and Macrobius, were acquainted with the influence of the sun and moon upon the tides. And Pliny says expressly, that the cause of the ebb and flow is in the sun, which attracts the waters of the ocean; and adds, that the waters rise in proportion to the proximity of the moon to the earth.

TIDES, *Theory of the*.—1. It is obvious, that if the earth were entirely fluid, and quiescent, its particles, by their mutual gravity towards each other, would form themselves into the figure of an exact sphere.

Suppose, then, that some power acts on all the particles of this earth with an equal force, and in parallel directions. the whole mass will be moved by such a power, but its figure will suffer no alteration by it; because all the particles, being equally moved by this power in parallel lines, they will still keep the same situation with respect to each other, and still form a sphere, whose centre will have the same motion as each particle. Upon this supposition, if the motion of the earth round the common centre of gravity of the earth and moon were destroyed, and the earth were left to the influence of its gravitation toward the moon, the earth falling toward the moon would still retain its spherical figure; all the parts being equally carried on, and retaining therefore the same situation with respect to each other. But the effects of the moon's action, as well as the action itself, on different parts of the earth, are unequal, at all places within the angular distance of 79½° from the line passing through the attracting body, either in the nearer or in the remoter hemisphere: those parts, by the general law of gravity, being most attracted which are nearest the moon, and those being least attracted which are farthest from the moon; while the parts that are at a middle distance, are attracted by a mean degree of force; besides, all the parts are not acted on in parallel lines, but in lines directed towards the centre of the moon; and on these accounts the spherical figure of the earth must suffer some change from the moon's action.

Supposing the earth to fall towards the moon, and abstracting from the mutual gravitation of its parts towards each other, and also from their cohesion; it will easily appear, that the parts nearest the moon would fall with the swiftest motion, being most attracted, and that they would leave the centre or greater bulk of the earth behind them in their fall, while the more remote parts would fall with the slowest motion, being less attracted than the rest, and be left a little behind the bulk of the earth, so as to be found at a greater distance from the centre of the earth than at the beginning of the motion. Whence it is manifest, that the earth would soon lose its spherical figure, and form itself into an oblong elliptic spheroid, whose longest diameter would point at the centre of the moon.

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If the particles of the earth did not gravitate toward each other, but toward the moon only, the distances betwixt the parts of the earth that are supposed to be nearest the moon, and the central parts, would continually increase, because of their greater celerity in falling; and the distance betwixt the central parts, and the parts that are farthest from the moon, would increase continually at the same time; these being left behind by the central parts, which they would follow, but with a less velocity. Thus the figure of the earth would become more and more oblong, that diameter of it which pointed toward the moon continually increasing.

But there is another reason why the earth would soon assume an oblong spheroidal form, if its parts were allowed to fall freely by their gravity towards the moon's centre; for the lateral parts of the earth, or those which are at the distance of a quarter of a circle from the point which is directly below the moon, and the central parts descending with equal velocities toward the same point, *viz.* the centre of the moon, in approaching to it, would manifestly approach, at the same time, to each other; and their distance becoming less, the diameters of the earth passing through them would be diminished, so that the diameters of the earth that point toward the moon would increase, and those diameters of the earth that are perpendicular to the line joining the centres of the earth and moon, would decrease at the same time, and render the figure of the earth still more oblong for this reason.

Let us now allow the parts of the earth to gravitate towards its centre; and, as this gravitation far exceeds the action of the moon, and much more exceeds the differences of her actions on different parts of the earth, the effect resulting from the inequalities of these actions of the moon, will be only a small diminution of the gravity of those parts of the earth which it endeavoured in the former supposition to separate from its centre, and a small addition to the gravity of those parts which it endeavoured to bring nearer to its centre; that is, those parts of the earth which are nearest to the moon, and those which are farthest from her, will have their gravity toward the earth somewhat abated; whereas the lateral parts will have their gravity increased; so that if the earth be supposed fluid, the columns from the centre to the nearest, and to the farthest parts must rise, till, by their greater height, they be able to balance the other columns, whose gravity is either not so much diminished, or is increased by the inequalities of the action of the moon. And thus the figure of the earth must still be an oblong spheroid.

Let us now consider the earth, instead of falling toward the moon by its gravity, as projected in any direction, so as to move round the centre of gravity of the earth and moon; it is manifest, that the gravity of each particle toward the moon will endeavour to bring it as far from the tangent, in any small moment of time, as if the earth were allowed to fall freely toward the moon; in the same manner as any projectile, at our earth, falls from the line of projection as far as it would fall by its gravity in the perpendicular in the same time. Consequently the parts of the earth nearest to the moon will endeavour to fall farthest from the tangent, and those farthest from the moon will endeavour to fall least from the tangent, of all parts of the earth; and the figure of the earth, therefore, will be the same as if the earth fell freely toward the moon; that is, the earth will still affect a spheroidal form, having its longest diameter directed toward the moon.

In order to understand this theory, it must be carefully considered, that it is not the action of the moon, but the

inequalities in that action, that produce any variation from the spherical figure; and that if this action were the same in all the particles as in the central parts, and operating in the same direction, no such change would ensue.

For the farther illustration of the preceding observations, we must perceive that the waters at Z (*Plate I. Geography, fig. 10.*) on the side of the earth A B C D E F G H, next to the moon M, are more attracted than the central parts of the earth, O, by the moon, and the central parts are more attracted by her than the waters on the opposite side of the earth at n; and therefore the distance between the earth's centre and the waters on its surface, under and opposite to the moon, will be increased. For let H, O, and D be three bodies, all equally attracted by the body M, and they will all move equally fast toward it, their mutual distances from each other continuing the same. If the attraction of M is unequal, then that body which is most strongly attracted will move fastest, and this will increase its distance from the other body. Consequently, by the law of gravitation, M will attract H more strongly than it does O, by which the distance between H and O will be increased; and a spectator in O will perceive H rising higher toward Z. In like manner O, being more strongly attracted than D, will move farther toward M than D does; and therefore the distance between O and D will be increased; and a spectator in O, not perceiving his own motion, will see D receding farther from him towards n; all effects and appearances being the same, whether D recedes from O, or O from D.

Suppose now there is a number of bodies, as A, B, C, D, E, F, G, H, placed round O, so as to form a flexible or fluid ring; then, as the whole is attracted toward M, the parts at H and D will have their distance from O increased; whilst the parts at B and F, being nearly at the same distance from M as O is, will not recede from one another; but rather, by the oblique attraction of M, they will approach nearer to O. Hence the fluid ring will form itself into an ellipse Z I B L n K F N Z, whose longer axis n O Z produced, will pass through M, and its shorter axis, B O F, will terminate in B and F. Let the ring be filled with fluid particles, so as to form a sphere round O; then, as the whole moves toward M, the fluid sphere, being lengthened at Z and n, will assume an oblong or oval form. If M is the moon, O the earth's centre, A B C D E F G H the sea covering the earth's surface, it is evident that, whilst the earth by its gravity falls towards the moon, the water directly below her at H will swell, and gradually rise toward her; and also the water at D will recede from the centre, (or, strictly speaking, the centre recedes from D,) and rise on the opposite side of the earth; whilst the water at B and F is depressed, and falls below the former level. Hence, as the earth turns round its axis from the moon to the moon again in about 24 $\frac{1}{2}$  hours, this oval of water must shift with it; and thus there will be two tides of flood and two of ebb in that time.

Some persons have found a difficulty in conceiving how, agreeably to the principles above stated, the earth can fall towards the moon by the power of gravity, when the moon is full, or in opposition to the sun; since the earth revolves about the sun, and must continually fall towards it; and if the earth is constantly falling towards the moon, they must at last come together. In order to obviate this difficulty, it has been suggested, that it is not the centre of the earth that describes the annual orbit round the sun, but the common centre of gravity of the earth and moon, the distance of which from the earth's centre, dividing 240,000 miles, the moon's distance from the earth, by 40, the excess of the earth's weight above that of the moon, is 6000 miles; and that

that whilst the earth is moving round the sun, it also describes a circle round that centre of gravity, going as many times round it in one revolution about the sun as there are lunations or courses of the moon round the sun in a year; and therefore the earth is constantly falling towards the moon from a tangent to the circle which it describes round the said common centre of gravity. Let *M* (*fig. 11.*) be the moon, *TW* part of the moon's orbit, and *C* the centre of gravity of the earth and moon: whilst the moon goes round her orbit, the centre of the earth describes the circle *dgc* round *C*, to which circle *gak* is a tangent; and, therefore, when the moon has gone from *M* a little beyond *W*, the earth has moved from *g* to *e*, and in that time has fallen towards the moon, from the tangent at *a* to *e*, and so on round the whole circle.

From the above reasoning it appears, that the parts of the earth directly under the moon, or that have the moon in their zenith, and also those in the nadir, or places diametrically opposite to each other, will have the flood, or high water at the same time.

Moreover, those parts of the earth, where the moon appears in the horizon, or  $90^\circ$  distant from the zenith and nadir, will have the ebbs, or lowest waters.

It is evident that, by the motion of the earth on its axis, the most elevated part of the water is carried beyond the moon in the direction of the rotation. The water continues to rise after it has passed directly under the moon, though the immediate action of the moon there begins to decrease, and comes not to its greatest elevation till it has got half a quadrant farther. It continues also to descend after it has passed at  $90^\circ$  distance from the point below the moon, though the force which the moon adds to its gravity begins to decrease there. For still the action of the moon adds to its gravity, and makes it descend till it has got half a quadrant farther; the greatest elevation, therefore, is not in the points which are in a line with the centres of the earth and moon, but about half a quadrant to the east of these points in the direction of the motion of rotation. Thus in open seas, where the water flows freely, the moon, *M*, (*fig. 10.*) is generally past the north and south meridian, as at *p*, when the high water is at *Z* and at *n*: the reason of which is plain, because the moon acts with some force after she has past the meridian, and thereby adds to the libratory or waving motion, which the water acquired when she was in the meridian; and, therefore, the time of high water is not precisely at the time of her coming to the meridian, but some time after.

Besides, the tides answer not always to the same distance of the moon from the meridian at the same places; but are variously affected by the action of the sun, which brings them on sooner when the moon is in her first and third quarters, and keeps them back later when she is in her second and fourth; because, in the former case, the tide raised by the sun alone, would be earlier than the tide raised by the moon, and in the latter case later.

For the further illustration of the principle upon which lunar tides depend, we shall suppose, with Dr. Young, that the earth were wholly fluid, and the same part of its surface were always turned towards the moon; in which case, the pole of the spheroid being immediately under the moon, the lunar tide would remain stationary; the greatest elevation being at the points nearest to the moon and farthest from her, and the greatest depression in the circle equally distant from these points; the elevation, however, being twice as great as the depression, on account of the smaller surface to which it is confined. The actual height of this elevation would probably be about 40 inches, and the depression 20, making together a tide of five feet. If also the waters were

capable of assuming instantly such a form as the equilibrium would require, the summit of a spheroid equally elevated would still be directed towards the moon, notwithstanding the earth's rotation. This may be called the primitive tide of the ocean: but on account of the perpetual change of place which is required for the accommodation of the surface to a similar position with respect to the moon, as the earth revolves, the form must be materially different from that of such a spheroid of equilibrium. The force employed in producing this accommodation, may be estimated by considering the actual surface of the sea as that of a wave moving on the spheroid of equilibrium, and producing in the water a sufficient velocity to preserve the actual form. We may deduce, says Dr. Young, from this mode of considering the subject, a theory of the tides which appears to be more simple and satisfactory than any which has yet been published: and by comparing the tides of narrower seas and lakes with the motions of pendulums suspended on vibrating centres, we may extend the theory to all possible cases.

If the centre of a pendulum be made to vibrate, the vibrations of the pendulum itself, when they have arrived at a state of permanence, will be performed in the same time with those of the centre; but the motion of the pendulum will be either in the same direction with that of the centre, or in a contrary direction, accordingly as the time of this forced vibration is longer or shorter than that of the natural vibration of the pendulum; and in the same manner it may be shewn that the tides, either of an open ocean or of a confined lake, may be either direct or inverted with respect to the primitive tide, which would be produced, if the waters always assumed the form of the spheroid of equilibrium, according to the depth of the ocean, and to the breadth as well as the depth of the lake. In the case of a direct tide, the time of the passage of the luminary over the meridian must coincide with that of high water, and in the case of an inverted tide with that of low water.

In order that the lunar tides of an open ocean may be direct, or synchronous, its depth must be greater than 13 miles, and for the solar tides than 14. The less the depth exceeded these limits, the greater the tides would be, and in all cases they would be greater than the primitive tides. But in fact the height of the tides in the open ocean is always far short of that which would be produced in this manner; it is therefore improbable that the tides are ever direct in the open ocean, and that the depth of the sea is so great as 13 miles.

In order that the height of the inverted or remote lunar tides may be five feet, or equal to that of the primitive tides, the depth of the open sea must be  $6\frac{1}{2}$  miles; and if the height is only two feet, which is perhaps not far from the truth, the depth must be  $3\frac{1}{2}$  miles.

The tides of a lake or narrow sea differ materially from those of the open ocean, since the height of the water scarcely undergoes any variation in the middle of the lake; it must always be high water at the eastern extremity when it is low water at the western: and this must happen at the time when the places of high and low water, with respect to the primitive tides, are equally distant from the middle of the lake.

The tides may be direct in a lake 100 fathoms deep and less than  $8^\circ$  wide; but if it be much wider, they must be inverted. Supposing the depth a mile, they will be direct when the breadth is less than  $25^\circ$ ; but if a sea, like the Atlantic, were 50 or 60 degrees wide, it must be at least four miles deep, in order that the time of high water might coincide with that of the moon's southing.

Hitherto we have considered the motion of the water as free

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free from all resistance ; but where the tides are direct, they must be retarded by the effect of a resistance of any kind ; and where they are inverted, they must be accelerated ; a small resistance producing, in both cases, a considerable difference in the time of high water.

Where a considerable tide is observed in the middle of a limited portion of the sea, it must be derived from the effect of the elevation or depression of the ocean in its neighbourhood ; and such derivative tides are probably combined in almost all cases with the oscillations belonging to each particular branch of the sea.

Lunar tides, the rise and progress of which are scientifically traced by Dr. Young, are subject, independently of the influence of the sun, to a variety of modifications, some of which we shall specify in the sequel of this article.

2. We have hitherto taken notice only of the action of the moon in producing tides ; but it is manifest that, for the same reasons, the inequality of the sun's action on different parts of the earth would produce a like effect, and that this alone would cause a like variation from the exact spherical figure of a fluid earth. So that, in reality, there are two tides every natural day from the action of the sun, as there are in the lunar day from that of the moon, subject to the same laws ; and the lunar tide, as we have observed, is somewhat changed by the action of the sun, and the change varies every day on account of the inequality between the natural and the lunar day. Indeed, the effect of the sun in producing tides, because of his immense distance, must be considerably less than that of the moon, though the gravity toward the sun be much greater, the solar tide being, as Dr. Young states it, only about two-fifths of the lunar. For it is not the action of the sun or that of the moon, but the inequalities in the actions of each, which have any effect. The sun's distance is so great, that the diameter of the earth is as a point compared to it, and the difference between the action of the sun on the nearest, and that on the farthest parts, becomes, on this account, vastly less than it would be if the sun were as near as the moon.

However, the immense bulk of the sun makes the effect still sensible, even at so great a distance ; and, therefore, though the action of the moon has the greatest share in producing the tides, the action of the sun adds sensibly to it when they conspire together, as in the change and full of the moon, when they are nearly in the same line with the centre of the earth, and therefore unite their forces. Thus, in conjunction, or when the sun and moon are on the same side of the earth, they both conspire to raise the water in the zenith, and consequently in the nadir ; and when they are in opposition, that is, when the earth is between them, whilst one makes high water in the zenith and nadir, the other does the same in the nadir and zenith. Consequently, in the syzygies, or at new and full moon, the tides are the greatest, and are what we call the *spring-tides*. Moreover, the action of the sun diminishes the effect of the moon's action in the first and last quarters, because the one raises the water in that case where the other depresses it ; and therefore, in the quadratures the tides are the least, and are called *neap-tides*.

As the lunar tide is much larger than the solar tide, the former must always determine the time of high and low water, which, in the spring and neap-tides, remains unaltered by the effect of the sun ; so that in the neap-tides the actual time of low water is that of the solar high water ; but at the intermediate times, the lunar high water is more or less accelerated or retarded. The progress of this alteration may easily be traced by means of a simple construction. If we make a

triangle, of which two of the sides are two feet and five feet in length ; the external angle which they form being equal to twice the distance of the luminaries, the third side will shew precisely the magnitude of the compound tide, and the halves of the two angles opposite to the first two sides the acceleration, or retardation, of the times of high water belonging to the separate tides respectively. Hence it appears that the greatest deviation of the joint tide from the lunar tide amounts to  $11^{\circ} 48'$  in longitude, and the time corresponding to  $47$  minutes, supposing the proportion of the forces to remain always the same ; but in fact the forces increase in proportion as the cubes of the distances of their respective luminaries diminish, as well as from other causes ; and in order to determine their joint effects, the lengths of the sides of the triangle must be varied accordingly. In some ports, from a combination of circumstances in the channel, by which the tides reach them, or in the seas, in which they originate, the influence of the sun and moon may acquire a proportion somewhat different from that which naturally belongs to them : thus at Brest, the influence of the moon appears to be three times as great as that of the sun ; when it is usually only twice and a half as great.

Sir Isaac Newton has calculated the effects of the sun and moon respectively upon the tides from their attractive powers. The augmentation of the gravity of the lateral parts of the earth, produced by the action of the sun, is a similar effect to an augmentation, estimated by him on another occasion, that is made to the gravity of the moon toward the earth by the same action, when the moon is in the quarters ; only the addition made to the gravity of the lateral parts is about  $60\frac{1}{2}$  times less, because their distance from the earth's centre is so many times less than the distance of the moon from it. The gravity of those parts of the earth that are directly beneath the sun, and of those opposite to it, is diminished by a double quantity of what is added to the lateral parts ; and as the diminution of gravity of the one, and augmentation of gravity of the other, conspire together in raising the water under the sun, and the parts opposite to it, above its height in the lateral parts ; the whole force that produces this effect is to be considered as triple of what is added to the gravity of the lateral parts ; and is thence found to be to the gravity of the particles as  $1$  to  $12868200$ , and to the centrifugal force at the equator as  $1$  to  $44527$ . The elevation of the waters by this force is considered by Newton as an effect similar to the elevation of the equatorial parts above the polar parts of the earth, arising from the centrifugal force at the equator ; and, being  $44527$  times less, is found to be  $1$  foot and  $11\frac{1}{5}$  inches, Paris measure. This is the elevation arising from the action of the sun upon the water.

Mr. Maclaurin makes this elevation to be  $1$  foot  $10\frac{865}{10000}$  inches, of the same measure, which differs from the above estimate by the  $\frac{1}{5}$ th part of an inch ; and the greatest elevation, when the sun is in the equinoctial,  $1$  foot  $11\frac{1}{5}$  inches.

In order to find the force of the moon upon the water, Newton compares the spring-tides, at the mouth of the river Avon, below Bristol, with the neap-tides there, and finds their proportion to be that of  $9$  to  $5$  ; whence, after several necessary corrections, he concludes, that the force of the moon is to that of the sun, in raising the waters of the ocean, as  $4.4815$  to  $1$  ; so that the force of the moon is able, of itself, to produce an elevation of  $8$  feet and  $7\frac{2}{3}$  inches, and the sun and moon together may produce an elevation of about  $10\frac{1}{2}$  feet, in their mean distances from the earth, and an elevation of about  $12$  feet, when the

moon is nearest the earth. The height to which the water is found to rise, upon coasts of the open and deep ocean, is agreeable enough to this computation.

Dr. Horsley estimates the force of the moon to that of the sun as 5.0469 to 1. Newton Princip. lib. iii. sect. iii. prop. 36, 37, apud Newt. Op. Ed. Horsley, vol. iii. p. 104. &c. and Maclaurin's Diff. de Causa Physica Fluxus & Refluxus Maris, apud Phil. Nat. Princ. Math. Comment. le Seur & Jacquier, tom. iii. p. 272.

3. It must be observed that the spring-tides do not happen precisely at new and full moon, nor the neap-tides at the quarters, but a day or two after, (at least two, and commonly three tides after,) because, as in other cases, so in this, the effect is not greatest or least when the immediate influence of the cause is greatest or least. As, *e. g.* the greatest heat is not on the solstitial day, when the immediate action of the sun is greatest, but some time after.

That this may be more clearly understood, let it be considered, that though the actions of the sun and moon were to cease this moment, yet the tides would continue to have their course for some time; for the water, where it is now highest, would subside, and flow down on the parts that are lower, till, by the motion of descent, being there accumulated to too great a height, it would necessarily return again to its first place, though in a less measure, being retarded by the resistance arising from the attraction of its parts. Thus it would for some time continue in an agitation like to that in which it is at present. The waves of the sea, that continue after a storm ceases, and every motion almost of a fluid, may illustrate this.

The resistance of fluids, in general, says Dr. Young, is as the square of the velocity, consequently it must be much greater for the lunar than for the solar tide, in proportion to the magnitude of the force; and the acceleration of the lunar tide produced by this cause must be greater than that of the solar: hence it may happen, that when the lunar tide occurs two or three hours after the transit of the moon, the solar tide may be three or four hours after that of the sun, so as to be about an hour later, at the times of conjunction and opposition, and the tides will be highest when the moon passes the meridian about an hour after the sun; while at the precise time of the new and full moon, the lunar tide will be retarded about a quarter of an hour by the effect of the solar tide.

4. The different distances of the moon from the earth produce a sensible variation in the tides. When the moon approaches the earth, her action on every part increases, and the differences of that action on which the tides depend, increase. For her action increases as the squares of the distances decrease; and though the differences of the distances themselves be equal, yet there is a greater disproportion betwixt the squares of less, than the squares of greater quantities; *e. g.* 3 exceeds 2, as much as 2 exceeds 1; but the square of 2 is quadruple of the square of 1, whilst the square of 3 (*viz.* 9) is little more than double the square of 2 (*viz.* 4).

Thus it appears, that by the moon's approach, her action on the nearest parts increases more quickly than her action on the remote parts; and the tides, therefore, increase in a higher proportion as the distances of the moon decrease. Sir Isaac Newton shews, that the tides increase in proportion as the cubes of the distances decrease, so that the moon, at half her present distance, would produce a tide eight times greater.

The moon describes an ellipse about the earth, and in her nearest distance produces a tide sensibly greater than at her

greatest distance from the earth: and hence it is, that two great spring-tides never succeed each other immediately; for if the moon be at her nearest distance from the earth at the change, she must be at her greatest distance at the full, having, in the intervening time, finished half a revolution; and, therefore, the spring-tide then will be much less than the tide at the change was: and for the same reason, if a great spring-tide happens at the time of full moon, the tide at the ensuing change will be less.

5. The spring-tides are greatest about the time of the equinoxes, *i. e.* about the latter end of March and September, and least about the time of the solstices, *i. e.* toward the end of June and December; and the neap-tides are least at the equinoxes and greatest at the solstices; so that the difference betwixt the spring and the neap-tides is much less considerable at the solstitial than at the equinoctial seasons. In order to illustrate and evince the truth of this observation, it is manifest, that if either the sun or moon were in the pole, they could have no effect on the tides, for their action would raise all the water at the equator to the same height, and any place of the earth, in describing its parallel to the equator, would not meet, in its course, with any part of the water more elevated than another, so that there could be no tide in any place.

The effect of the sun or moon is greatest when in the equinoctial; for then the axis of the spheroidal figure, arising from their action, moves in the greatest circle, and the water is put into the greatest agitation; and hence it is that the spring-tides produced, when the sun and moon are both in the equinoctial, are the greatest of any, and the neap-tides are the least of any, about that time.

But the tides produced when the sun is in either of the tropics, and the moon in either of her quarters, are greater than those produced when the sun is in the equinoctial, and the moon in her quarters, because, in the first case, the moon is in the equinoctial, and in the latter case, the moon is in one of the tropics; and the tide depends more on the action of the moon than that of the sun, and is, therefore, greatest when the moon's action is greatest.

However, it is necessary to observe, 6. That, because the sun is nearer the earth in winter than in summer, *i. e.* in February and October than in March and September, the greatest spring-tides are after the autumnal, and before the vernal equinox.

7. Since the greatest of the two tides happening in every diurnal revolution of the moon, or lunar day, *i. e.* about 24<sup>h</sup> 50<sup>m</sup>, is that in which the moon is nearest the zenith, or nadir; for this reason, while the sun is in the northern signs, the greater of the two diurnal tides in our climates, is that arising from the moon above the horizon: when the sun is in the southern signs, the greatest is that arising from the moon below the horizon.

In proof of this observation, let it be considered, that when the moon declines from the equator toward either pole, one of the greatest elevations of the water follows the moon, and describes nearly the parallel on the earth's surface which is under that which the moon, on account of the diurnal motion, seems to describe; and the opposite greatest elevation, being antipodal to that, must describe a parallel as far on the other side of the equator; so that while the one moves on the north side of the equator, the other moves on the south side of it, at the same distance. Now the greatest elevation which moves on the same side of the equator, with any place, will come nearer to it than the opposite elevation, which moves in a parallel on the other side of the equator; and, therefore, if a place is on the same

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side of the equator with the moon, the day-tide, or that which is produced while the moon is above the horizon of the place, will exceed the night-tide, or that which is produced while the moon is under the horizon of the place. It is the contrary if the moon is on one side, and the place on the other side of the equator; for then the elevation which is opposite to the moon, moves on the same side of the equator with the place, and, therefore, will come nearer to it than the other elevation. The difference will be greatest when the sun and moon both describe the tropics; because the two elevations in that case describe the opposite tropics, which are the farthest from each other of any two parallel circles they can describe. Thus it is found, by observation, that the evening tides in the summer exceed the morning tides, and the morning tides in winter exceed the evening tides. The difference is found at Bristol to amount to fifteen inches, and at Plymouth to one foot. It would be still greater, but that a fluid always retains an impressed motion for some time; so that the preceding tides affect always those that follow them. Upon the whole, while the moon has north declination, the greatest tides in the northern hemisphere are when she is above the horizon, and the reverse while her declination is south.

To illustrate this matter by figures; let  $NE SQ$  (*fig. 12*, *13*, *14*.) be the earth,  $NCS$  its axis,  $EQ$  the equator,  $T \infty$  the tropic of Cancer,  $t \wp$  the tropic of Capricorn,  $ab$  the arctic circle,  $cd$  the antarctic,  $N$  the north pole,  $S$  the south pole,  $M$  the moon,  $F$  and  $G$  the two eminences of water, whose lowest parts are at  $a$  and  $d$  (*fig. 12*.), at  $N$  and  $S$  (*fig. 13*.), and at  $b$  and  $c$  (*fig. 14*.), always  $90^\circ$  from the highest.

Now, when the moon is in her greatest north declination at  $M$  (*fig. 12*.), the highest elevation,  $G$ , under her is on the tropic of Cancer,  $T \infty$ , and the opposite elevation,  $F$ , on the tropic of Capricorn,  $t \wp$ ; and these two elevations describe the tropics by the earth's diurnal rotation. All places in the northern hemisphere,  $ENQ$ , have the highest tides when they come into the position  $b \infty Q$ , under the moon; and the lowest tides when the earth's diurnal rotation carries them into the position  $a T E$ , on the side opposite to the moon: the reverse happens at the same time in the southern hemisphere  $ESQ$ , as is evident to sight. The axis of the tides  $aCd$  has now its poles  $a$  and  $d$  (being always  $90^\circ$  from the highest elevations) in the arctic and antarctic circles; and, therefore, it is plain, that at these circles there is but one tide of flood, and one of ebb, in the lunar day. For when the point  $a$  revolves half round to  $b$  in twelve lunar hours, it has a tide of flood; but when it comes to the same point  $a$  again in twelve hours more, it has the lowest ebb. In seven days afterward, the moon  $M$  (*fig. 13*.) comes to the equinoctial circle, and is over the equator  $EQ$ , when both elevations describe the equator; and in both hemispheres, at equal distances from the equator, the tides are equally high in both parts of the lunar day. All the phenomena being reversed, when the moon has south declination, to what they were when her declination was north, require no farther description, *fig. 14*.

From what has been said it appears, that as the tides are governed by the moon, they must turn on the axis of the moon's orbit, which is inclined  $23\frac{1}{2}$  degrees to the earth's axis at a mean state; and, therefore, the poles of the tides must be so many degrees from the poles of the earth, or in opposite points of the polar circles, going round these circles in every lunar day. It is true that, according to *fig. 14*, when the moon is vertical to the equator  $ECQ$ , the poles of the tides seem to fall in with the poles of the

world  $N$  and  $S$ ; but when we consider that  $FGH$  is under the moon's orbit, it will appear that when the moon is over  $H$ , in the tropic of Capricorn, the north pole of the tides (which can be no more than  $90^\circ$  from under the moon) must be at  $C$  in the arctic circle, not at  $P$ , the north pole of the earth; and as the moon ascends from  $H$  to  $G$  in her orbit, the north pole of the tides must shift from  $c$  to  $a$  in the arctic circle, and the south pole as much in the antarctic.

It is not to be doubted, but that the earth's quick rotation brings the poles of the tides nearer to the poles of the world than they would be if the earth were at rest, and the moon revolved about it only once a month; for, otherwise, the tides would be more unequal in their heights, and times of their returns, than we find they are. But how near the earth's rotation may bring the poles of its axis and those of the tides together, or how far the preceding tides may affect those which follow, so as to make them keep up nearly to the same heights, and times of ebbing and flowing, is a problem more fit to be solved by observation than by theory.

Those who have opportunity to make observations, and choose to satisfy themselves whether the tides are really affected in the above manner by the different positions of the moon, especially as to the unequal times of their returns, may take this general rule for knowing when they ought to be so affected. When the earth's axis inclines to the moon, the northern tides, if not retarded in their passage through shoals and channels, nor affected by the winds, ought to be greatest when the moon is above the horizon, least when she is below it; and quite the reverse when the earth's axis declines from her; but in both cases at equal intervals of time. When the earth's axis inclines sideways to the moon, both tides are equally high, but they happen at unequal intervals of time. In every lunation the earth's axis inclines once to the moon, once from her, and twice sideways to her, as it does to the sun every year; because the moon goes round the ecliptic every month, and the sun but once in a year. In summer, the earth's axis inclines towards the moon when new; and, therefore, the day-tides in the north ought to be highest, and night-tides lowest about the change: at the full the reverse. At the quarters they ought to be equally high, but unequal in their returns; because the earth's axis then inclines sideways to the moon. In winter the phenomena are the same at full moon as in summer at new. In autumn the earth's axis inclines sideways to the moon when new and full; therefore the tides ought to be equally high and unequal in their returns at these times. At the first quarter the tides of flood should be least when the moon is above the horizon, greatest when she is below it, and the reverse at her third quarter. In spring, the phenomena of the first quarter answer to those of the third quarter in autumn, and *vice versa*. The nearer any time is to either of these seasons, the more the tides partake of the phenomena of these seasons; and in the middle between any two of them, the tides are at a mean state between those of both.

8. Such would the tides regularly be, if the earth were all over covered with sea very deep, so that the water might follow the influence of the sun and moon; but, by reason of the shoalness of some places, and the narrowness of the straits in others, by which the tides are propagated, there arises a great diversity in the effect, not to be accounted for, without an exact knowledge of all the circumstances of the places; such as the position of the land, and the breadth and depth of the channels, direction of the winds, &c. For a very slow and imperceptible motion of the whole body of water,

water, where it is (for example) two miles deep, will suffice to raise its surface ten or twelve feet in a tide's time; whereas, if the same quantity of water were to be conveyed through a channel forty fathoms deep, it would require a very great stream to effect it in so large inlets as are the channel of England and the German ocean; whence the tide is found to set strongest in those places where the sea grows narrowest, the same quantity of water being, in that case, to pass through a smaller passage.

This is most evident in the straits between Portland and Cape la Hogue in Normandy, where the tide runs like a sluice; and would be yet more between Dover and Calais, if the tide, coming round the island, did not check it.

This force, being once impressed upon the water, continues to carry it above the level of the ordinary height of the ocean, particularly where the water meets a direct obstacle, as it does in St. Maloes; and where it enters into a long channel, which running far into the land, grows very strait at its extremity, as it does into the Severn sea at Chepstow, where the tide rises to 40 feet, and Bristol, where its height is 30 feet. At Brest, the height of the tides is about 20 feet; at St. Maloes, 50; at Annapolis, in the bay of Fundy, as much sometimes as 100 feet. In the Mediterranean, the tides are generally inconsiderable; nevertheless they are perceptible: at Naples, they sometimes rise to a foot; at Venice, to more than two feet; and in the Euripus, for a certain number of days in each lunation, they are very distinctly observable from the currents which they occasion. In the West Indies, and also in the gulf of Mexico, the tides are less observable than in the neighbouring seas, perhaps on account of some combinations derived from the variations of the depth of the rivers, and from the different channels by which they are propagated.

The shallowness of the sea, and the intercurrent continents, are the reasons that in the open ocean the tides rise but to very small heights in proportion to what they do in wide-mouthed rivers, opening in the direction of the stream of the tide; and that high-water is not at the time of the moon's appulse to the meridian, but always some hours after it, as it is observed upon all the western coasts of Europe and Africa, from Ireland to the Cape of Good Hope; in all which a fourth-west moon makes high water; and the same is reported to hold in the west of America.

So that tides happen to different places at all distances of the moon from the meridian, and consequently at all hours of the lunar day.

It is to be considered that, in order to allow the tides their full motion, the ocean, in which they are produced, ought to be extended from east to west 90° at least. Because the places, where the moon rises most, and most depresses the water, are at that distance from each other. Hence it appears, that it is only in the great oceans that such tides can be produced, and why in the larger Pacific ocean they exceed those in the Atlantic ocean. Hence also it is obvious, why the tides are not so great in the torrid zone, between Africa and America, where the ocean is narrower, as in the temperate zones on either side; and we may hence also understand, why the tides are so small in islands that are very far distant from the shores. It is manifest, that, in the Atlantic ocean, the water cannot rise on one shore but by descending on the other; so that, at the intermediate distant islands, it must continue at a mean height betwixt its elevation on one and on the other shore. But when tides pass over shoals, and through straits into bays of the sea, their motion becomes more various, and their height depends on many circumstances.

The tide entering the Atlantic appears, says Dr. Young, to advance northwards at the rate of about 500 miles an hour, corresponding to a depth of about three miles, so as to reach Sierra Leone at the eighth hour after the moon's southing; this part of Africa being not very remote from the meridian of the middle of the South Atlantic ocean, and having little share in the primitive tides of that ocean. The southern tide seems then to pass by Cape Blanco and Cape Bojador, to arrive at Gibraltar at the thirteenth hour, and to unite its effects with those of other tides at various parts of the coasts of Europe.

We may therefore consider the Atlantic as a detached sea, about 3500 miles broad, and three miles deep; and a sea of these dimensions is susceptible of tides considerably larger than those of the ocean, but how much larger we cannot determine without more accurate measures. These tides would happen on the European coasts, if there were no resistance, a little less than five hours after the moon's southing, and on the coast of America, a little more than seven hours after; but the resistance opposed to the motion of the sea may easily accelerate the time of high-water in both cases about two hours, so that it may be a little before the third hour on the western coasts of Europe and of Africa, and before the fifth on the most exposed parts of the eastern coast of America; and in the whole of the Atlantic, this tide may be combined more or less both with the general southern tide, and with the partial effects of local elevations or depressions of the bottom of the sea, which may cause irregularities of various kinds. The southern tide is, however, probably less considerable than has sometimes been supposed, for, in the latitudes in which it must originate, the extent of the elevation can only be half as great as at the equator; and the islands of Kerguelen's land and South Georgia, in the latitudes of about 50° and 55°, have their tides delayed till the tenth and eleventh hours, apparently because they received them principally from distant parts of the ocean, which are nearer to the equator.

On the western coasts of Europe, from Ireland to Cadiz; on those of Africa, from Cape Coast to the Cape of Good Hope; and on the coast of America, from California to the straits of Magellan, as well as in the neighbouring islands; it is usually high-water at some time between two and four hours after the moon's southing; on the eastern coast of South America, between four and six; on that of North America, between seven and eleven; and on the eastern coasts of Asia and New Holland, between four and eight. The Society Islands are perhaps too near the middle of the Pacific ocean to partake of the effects of its primitive tide, and their tide, being secondary, is probably for this reason a few hours later. At the Almirantes, near the eastern coast of Africa, the tide is at the sixth hour; but there seem to be some irregularities in the tides of the neighbouring islands.

The progress of a tide may be very distinctly traced from its source in the ocean into the narrow and shallow branches of the sea which constitute our channels. Thus the tide is an hour or two later at the Scilly Islands than in the Atlantic, at Plymouth three, at Cork, Bristol, and Weymouth four, at Caen and Havre six, at Dublin and Brighthelmston seven, at Boulogne and Liverpool eight, at Dover near nine, at the Nore eleven, and at London-bridge twelve and a half. Another portion appears to proceed round Ireland and Scotland into the North sea; it arrives from the Atlantic at Londonderry in about three hours, at the Orkneys in six, at Aberdeen in eleven, at Leith in fourteen, at Loestoffe in twenty, and at the Nore in about twenty-four, so as to meet there the subsequent tide coming from the south. From the time occupied by the tide in travelling from the mouth of the English Channel

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Channel to Boulogne, at the rate of about fifty miles an hour, we may calculate that the mean depth of the channel is about twenty-eight fathoms, independently of the magnitude of the resistances of various kinds to be overcome, which require us to suppose the depth from thirty to forty fathoms. In the great river of Amazons, the effects of the tides are still sensible at the freights of Pauxis, 500 miles from the sea, after an interval of several days spent in their passage up: for the slower progressive motion of the water no more impedes the progress of a wave against the stream, than the velocity of the wind prevents the transmission of sound in a contrary direction.

Dr. Young observes, that scarcely a single instance occurs that favours the supposition of high water in the open sea being within an hour of the moon's southing, as it must be if the depth were very great; so that neither the height of the tide, nor the time of high-water, will allow us to suppose the sea any where quite so deep as four miles.

The tide that is produced on the western coasts of Europe, in the Atlantic, corresponds to the situation of the moon already described. Thus it is high-water on the coasts of Spain, Portugal, and the west of Ireland, about the third hour after the moon has passed the meridian; from thence it flows into the adjacent channels, as it finds the easiest passage. One current from it, *e. g.* runs up by the south of England, another comes in by the north of Scotland; they take a considerable time to move all this way, and it is high-water sooner in the places to which they first come, and it begins to fall at those places, while they are still going on to others that are farther in their course. As they return, they are not able to raise the tide, because the water runs faster off than it returns, till, by a new tide propagated from the open ocean, the return of the current is stopped, and the water begins to rise again. The tide, propagated by the moon in the German ocean, when she is three hours past the meridian, takes about twelve hours to come from thence to London-bridge; so that when it is high-water there, a new tide is already come to its height in the ocean; and, in some intermediate place, it must be low water at the same time.

Consequently, when the moon has north declination, and we should expect the tide at London to be the greatest when the moon is above the horizon, we find it is least; and the contrary when she has south declination.

At several places it is high-water three hours before the moon comes to the meridian; but that tide which the moon pushes, as it were, before her, is only the tide opposite to that which was raised by her when she was nine hours past the opposite meridian.

It would be endless to recount all the particular solutions which are easy corollaries from this doctrine: as why the lakes and seas, such as the Caspian sea and the Mediterranean sea, the Black sea and Baltic, have either small or no very sensible tides: for lakes are generally so small, that when the moon is vertical she attracts every part of them alike, and therefore no part of the water can be raised higher than another: and having no communication with the ocean, it can neither increase nor diminish their water, in order to rise and fall; and seas that communicate by such narrow inlets, and are of so immense an extent, cannot, in a few hours time, receive and empty water enough to raise or sink their surface any thing sensibly.

To demonstrate the excellency of this doctrine, the example of the tides in the port of Batsha, in the kingdom of Tonquin, in the East Indies,  $20^{\circ} 50' N.$  lat. which are so extraordinary and different from all others we have yet heard of, may suffice.

The day in which the moon passes the equinoctial, the

water stagnates there without any motion; as the moon removes from the equinoctial, the water begins to rise and fall once a day; and it is high-water at the setting of the moon, and low-water at her rising. This daily tide increases for about seven or eight days, and then decreases for as many days by the same degrees, till this motion ceases, when the moon has returned to the equinoctial. When she has passed the equinoctial, and declines toward the south pole, the water rises and falls again as before; but it is high-water now at the rising, and low-water at the setting of the moon.

Sir Isaac Newton, in order to account for this extraordinary tide, considers that there are two inlets to this port of Batsha, one from the Chinese ocean, betwixt the continent and the Manillas, the other from the Indian ocean, betwixt the continent and Borneo. This leads him to propose, as a solution of this phenomenon, that a tide may arrive at Batsha, through one of these inlets, at the third hour of the moon, and another through the other inlet six hours after, at the ninth hour of the moon. For, while these tides are equal, the one flowing in as the other ebbs out, the water must stagnate: now they are equal when the moon is in the equinoctial; but as soon as the moon begins to decline on the same side of the equator with Batsha, it has been shewn that the diurnal tide must exceed the nocturnal, so that two greater and two lesser tides must arrive at Batsha by turns. The difference of these will produce an agitation of the water, which will rise to its greatest height at the mean time betwixt the two greatest tides, and fall lowest at a mean time betwixt the two least tides; so that it will be high-water about the sixth hour at the setting of the moon, and low-water at her rising. When the moon has got to the other side of the equinoctial, the nocturnal tide will exceed the diurnal; and, therefore, the high-water will be at the rising, and low-water at the setting of the moon.

The same principles will serve to account for other extraordinary tides, which, we are told, are observed in places whose situation exposes them to such irregularities: and, as some think, for particular currents and winds. See CURRENT and WINDS.

When the time of high-water at any place is, in general, mentioned, it is to be understood on the days of the syzygies, or days of new and full moon; when the sun and moon pass the meridian of the place at the same time. Among pilots, it is customary to reckon the time of flood, or high-water, by the point of the compass the moon bears on, allowing three quarters of an hour for each point, at that time; thus, on the full and change days, in places where it is flood at noon, the tide is said to flow N. and S., or at 12 o'clock; in other places, on the same days, where the moon bears 1, 2, 3, 4, or more points to the E. or W. of the meridian, when it is high-water, the tide is said to flow on such point; thus, if the moon bears S.E. at flood, it is said to flow S.E. and N.W. or three hours before the meridian, that is, at 9 o'clock; if it bears S.W. it flows S.W. and N.E. or at three hours after the meridian; and in like manner for other points of the moon's bearing.

The times of high-water in any place fall about the same hours after a period of about fifteen days, or between one spring-tide and another; but during that period, the times of high-water fall each day later by about forty-eight minutes.

From the observations of many persons there have been collected the times when it is high-water on the days of the new and full moon, on most of the sea-coasts of Europe, and many other places; which are usually put in a table against the names of the places; a specimen of which is subjoined.

# TIDES.

A TABLE of the Times of High-Water on the Days of the New and Full Moon, on most of the Sea-Coasts of Europe.

Names of Places.	Countries.	Coast.	High-Water.	
			H.	M.
Abbrevrak - - - -	France - - - -	English Channel - -	4	30
Aberdeen - - - -	Scotland - - - -	German Ocean - - - -	0	45
Aldborough - - - -	England - - - -	Ditto - - - - - - -	9	45
Alderney, Isle of - - - -	Ditto - - - -	English Channel - - -	12	0
Amazons, River (Mouth) - - - -	Amazon - - - -	Atlantic Ocean - - -	6	0
Ameyland, Isle of - - - -	Dutchland - - - -	German Ocean - - - -	7	30
Amsterdam - - - -	Ditto - - - -	Ditto - - - - - - -	3	0
Andrews, St. - - - -	Scotland - - - -	Ditto - - - - - - -	2	15
Anholt, Isle of - - - -	Denmark - - - -	Sound - - - - - - -	0	0
Antwerp - - - -	Flanders - - - -	River Schelde - - - -	6	0
Archangel - - - -	Russia - - - -	White Sea - - - - -	6	0
Arran, Isle of - - - -	Ireland - - - -	St. George's Channel -	11	0
Ashley, River - - - -	Carolina - - - -	Atlantic Ocean - - -	0	45
Augustine, St. - - - -	Florida - - - -	Ditto - - - - - - -	4	30
Baltimore - - - -	Ireland - - - -	Western Ocean - - - -	4	30
Barfleur, Cape - - - -	France - - - -	English Channel - - -	7	30
Bas, Isle de - - - -	Ditto - - - -	Ditto - - - - - - -	3	45
Bayonne - - - -	Ditto - - - -	Bay of Biscay - - - -	3	30
Beachy-Head - - - -	England - - - -	English Channel - - -	0	0
Bear, North } - - - -	Labrador - - - -	Hudson's Bay - - - -	12	0
Bear, South }				
Belfast - - - -	Ireland - - - -	Irish Sea - - - - -	10	0
Belleisle - - - -	France - - - -	Bay of Biscay - - - -	3	30
Bermudas, Island of - - - -	Bahama Isles - - - -	Atlantic Ocean - - - -	7	0
Berwick - - - -	England - - - -	German Ocean - - - -	2	30
Bic, Isle du - - - -	Acadia - - - -	River St. Lawrence - -	2	0
Blackney - - - -	England - - - -	German Ocean - - - -	6	0
Blanchart-Race - - - -	France - - - -	English Channel - - -	0	0
Blanco, Cape - - - -	Negroland - - - -	Atlantic Ocean - - - -	9	45
Bojador, Cape - - - -	Ditto - - - -	Ditto - - - - - - -	0	0
Boulogne - - - -	France - - - -	English Channel - - -	10	30
Bourdeaux - - - -	Ditto - - - -	Bay of Biscay - - - -	3	0
Breefound - - - -	Dutchland - - - -	German Ocean - - - -	4	30
Bremen - - - -	Germany - - - -	River Wefer - - - - -	6	0
Brest - - - -	France - - - -	Bay of Biscay - - - -	3	45
Bridlington Bay - - - -	England - - - -	German Ocean - - - -	3	45
Brill - - - -	Dutchland - - - -	Ditto - - - - - - -	1	30
Bristol - - - -	England - - - -	St. George's Channel -	6	45
Buchanefs - - - -	Scotland - - - -	German Ocean - - - -	3	0
Button's Isles - - - -	North Britain - - - -	Hudson's Straits - - -	6	50
Cadiz - - - -	Spain - - - -	Atlantic Ocean - - - -	4	30
Caen - - - -	France - - - -	English Channel - - -	9	0
Caithnefs Point - - - -	Scotland - - - -	Western Ocean - - - -	9	0
Calais - - - -	France - - - -	English Channel - - -	11	30
Caldy, Isle of - - - -	England - - - -	St. George's Channel -	5	15
Camfer - - - -	Dutchland - - - -	German Ocean - - - -	1	30
Canaria, Isle of - - - -	Canaries - - - -	Atlantic Ocean - - - -	3	0
Cantin, Cape - - - -	Barbary - - - -	Ditto - - - - - - -	0	0
Caskets - - - -	Guernsey - - - -	English Channel - - -	8	15
Charles, Isle of - - - -	Labrador - - - -	Hudson's Straits - - -	10	15
Charles-Town - - - -	Carolina - - - -	Ashley River - - - - -	3	0
Chignectow - - - -	Nova Scotia - - - -	Bay of Fundy - - - - -	0	45
Cherbourg - - - -	France - - - -	English Channel - - -	7	30
Churchill, Cape and River - - - -	North Wales - - - -	Hudson's Bay - - - - -	7	20
Clear, Cape - - - -	Ireland - - - -	Western Ocean - - - -	4	30
Concarneau - - - -	France - - - -	Bay of Biscay - - - -	3	0

# TIDES.

Names of Places.	Countries.	Coast.	High-Water.	
			H.	M.
Conquet - - - -	France - -	English Channel - -	2	15
Coquet, Isle of - - - -	England - -	German Ocean - - - -	3	0
Corke - - - -	Ireland - -	St. George's Channel - -	6	30
Corfe, Cape - - - -	Guinea - -	Ethiopian Sea - - - -	3	30
Cromer - - - -	England - -	German Ocean - - - -	7	0
Dartmouth - - - -	Ditto - -	English Channel - - - -	6	30
David's Head, St. - - - -	Wales - -	St. George's Channel - -	6	0
Dieppe - - - -	France - -	English Channel - - - -	10	30
Dort - - - -	Dutchland - -	German Ocean - - - -	3	0
Dover - - - -	England - -	English Channel - - - -	11	30
Downs - - - -	Ditto - -	German Ocean - - - -	1	15
Dublin - - - -	Ireland - -	Irish Sea - - - -	9	15
Dunbar - - - -	Scotland - -	German Ocean - - - -	2	30
Dundee - - - -	Ditto - -	Ditto - - - -	2	15
Dungarvan - - - -	Ireland - -	Atlantic Ocean - - - -	4	30
Dungeness - - - -	England - -	English Channel - - - -	9	45
Dunkirk - - - -	France - -	German Ocean - - - -	0	0
Dunnofe - - - -	Isle of Wight - -	English Channel - - - -	9	45
Edinburgh - - - -	Scotland - -	German Ocean - - - -	4	30
Edystone - - - -	England - -	English Channel - - - -	5	30
Elbe, River (Mouth) - - - -	Germany - -	German Ocean - - - -	0	0
Emden - - - -	Ditto - -	Ditto - - - -	0	0
Enchuyfen - - - -	Dutchland - -	Zuyder Sea - - - -	0	0
Etaples - - - -	France - -	English Channel - - - -	11	0
Falmouth - - - -	England - -	Ditto - - - -	5	30
Flamborough-Head - - - -	Ditto - -	German Ocean - - - -	4	0
Florida, Cape - - - -	Florida - -	Gulf of Mexico - - - -	7	30
Flushing - - - -	Dutchland - -	German Ocean - - - -	0	45
Fly, Isle of - - - -	Ditto - -	Ditto - - - -	7	30
Foreland, North - - - -	England - -	Ditto - - - -	9	45
Foreland, South - - - -	Ditto - -	English Channel - - - -	9	45
Foulness - - - -	Ditto - -	German Ocean - - - -	6	45
Foye - - - -	Ditto - -	English Channel - - - -	5	15
Garonne, River - - - -	France - -	Bay of Biscay - - - -	3	0
Gaspay Bay - - - -	Acadia - -	Gulf of St. Lawrence - -	1	30
Gibraltar - - - -	Spain - -	Mediterranean Sea - - -	0	0
Good Hope, Cape of - - - -	Cafiers - -	Indian Ocean - - - -	3	0
Granville - - - -	France - -	English Channel - - - -	7	0
Graveline - - - -	Ditto - -	Ditto - - - -	0	0
Gravefend - - - -	England - -	River Thames - - - -	1	30
Groine, or Cape Corunna - - - -	Spain - -	Bay of Biscay - - - -	3	0
Guernsey, Island of - - - -	England - -	English Channel - - - -	1	30
Haarlem - - - -	Dutchland - -	German Ocean - - - -	9	0
Halifax - - - -	Nova Scotia - -	Western Ocean - - - -	7	30
Hamburgh - - - -	Germany - -	River Elbe - - - -	6	0
Hartlepool - - - -	England - -	Ditto - - - -	3	0
Harwich - - - -	Ditto - -	Ditto - - - -	11	15
Havre de Grace - - - -	France - -	English Channel - - - -	9	0
Henry, Cape - - - -	Virginia - -	Atlantic Ocean - - - -	11	15
Holyhead - - - -	Wales - -	Irish Sea - - - -	1	30
Honfleur - - - -	France - -	River Seine - - - -	9	0
Hull - - - -	England - -	River Humber - - - -	6	0
Humber, River (Entrance) - - - -	Ditto - -	German Ocean - - - -	5	13
Ice Cove - - - -	North Main - -	Hudson's Straits - - - -	10	0
John's, Fort St. - - - -	Newfoundland - -	Atlantic Ocean - - - -	6	0
John de Luz, St. - - - -	France - -	Bay of Biscay - - - -	3	30
Julian, Port St. - - - -	Patagonia - -	South Atlantic Ocean - -	4	45
Kentish Knock, - - - -	England - -	German Ocean - - - -	0	0
Kilduin, Isle of - - - -	Lapland - -	Northern Ocean - - - -	7	30
Kinfale - - - -	Ireland - -	Atlantic Ocean - - - -	5	15
Land's-End - - - -	England - -	St. George's Channel - -	7	30
Leith - - - -	Scotland - -	German Ocean - - - -	4	30

# TIDES.

Names of Places.	Countries.	Coast.	High-Water.	
			H.	M.
Leostoffe - - - -	England - -	German Ocean - -	9	45
Lewes, Isle of, North Port - -	Scotland - -	Western Ocean - -	6	30
Lime - - - -	England - -	English Channel - -	7	0
Lisbon - - - -	Portugal - -	River Tagus - - - -	2	15
Liverpool - - - -	England - -	Irish Sea - - - -	11	15
Lizard - - - -	Ditto - -	English Channel - -	7	30
London - - - -	Ditto - -	River Thames - - - -	3	0
London, New - - - -	New England - -	Western Ocean - - - -	1	30
Long Island - - - -	Ditto - -	Ditto - - - -	3	0
Longsand-Head - - - -	England - -	German Ocean - - - -	10	30
Louis, Port - - - -	France - -	Bay of Biscay - - - -	3	0
Lundy, Isle of - - - -	England - -	St. George's Channel - -	5	15
Lynn - - - -	Ditto - -	German Ocean - - - -	6	0
Madeira, Island of - - - -	Canaries - -	Atlantic Ocean - - - -	12	4
Maes, River (Mouth) - - - -	Dutchland - -	German Ocean - - - -	1	30
Maloes, St. - - - -	France - -	English Channel - - - -	6	0
Man, Isle of (west end) - - - -	England - -	Irish Sea - - - -	9	0
Margate - - - -	Ditto - -	English Channel - - - -	11	15
Milford - - - -	Wales - -	St. George's Channel - -	5	15
Mount's Bay - - - -	England - -	English Channel - - - -	4	30
Nantes - - - -	France - -	Bay of Biscay - - - -	3	0
Naze - - - -	Norway - -	Western Ocean - - - -	11	15
Needles - - - -	England - -	English Channel - - - -	10	15
Newcastle - - - -	Ditto - -	German Ocean - - - -	3	15
Nieuport - - - -	Flanders - -	Ditto - - - -	12	0
Nore - - - -	England - -	River Thames - - - -	0	0
North Cape - - - -	Lapland - -	Northern Ocean - - - -	3	0
Orfordness - - - -	England - -	German Ocean - - - -	9	45
Orkney Isles, (limits) - - - -	Scotland - -	Western Ocean - - - -	3	0
Ostend - - - -	Flanders - -	German Ocean - - - -	12	0
Placentia - - - -	Newfoundland - -	Atlantic Ocean - - - -	9	0
Plymouth - - - -	England - -	English Channel - - - -	6	0
Portland - - - -	Ditto - -	Ditto - - - -	8	15
Portsmouth - - - -	Ditto - -	Ditto - - - -	11	15
Quebec - - - -	Canada - -	River St. Lawrence - - - -	7	30
Rhee, Isle of - - - -	France - -	Bay of Biscay - - - -	3	0
Rochefort - - - -	Ditto - -	Ditto - - - -	4	15
Rochelle - - - -	Ditto - -	Ditto - - - -	3	45
Rocheſter - - - -	England - -	River Medway - - - -	0	45
Rotterdam - - - -	Dutchland - -	German Ocean - - - -	3	0
Rouen - - - -	France - -	River Seine - - - -	1	15
Rye - - - -	England - -	English Channel - - - -	11	15
Sandwich - - - -	Ditto - -	Downs - - - -	11	30
Scarborough-Head - - - -	Ditto - -	German Ocean - - - -	3	45
Scilly Isles - - - -	Ditto - -	St. George's Channel - -	3	45
Seine, River - - - -	France - -	English Channel - - - -	9	0
Senegal, River - - - -	Negroland - -	Atlantic Ocean - - - -	10	30
Severn, River - - - -	England - -	St. George's Channel - -	6	0
Sheerneys - - - -	Ditto - -	River Thames - - - -	9	0
Shetland Island (limits) - - - -	Scotland - -	Western Ocean - - - -	3	0
Shoreham - - - -	England - -	English Channel - - - -	10	30
Sierra Leona - - - -	Guinea - -	Atlantic Ocean - - - -	8	15
Sky, Isle of - - - -	Ditto - -	Ditto - - - -	5	30
Southampton - - - -	England - -	English Channel - - - -	0	0
Spurn - - - -	Ditto - -	German Ocean - - - -	5	15
Start-Point - - - -	Ditto - -	English Channel - - - -	6	45
Stockton - - - -	Ditto - -	German Ocean - - - -	5	15
Strongford Bay - - - -	Ireland - -	Irish Sea - - - -	10	30
Sunderland - - - -	England - -	German Ocean - - - -	3	30
Swin - - - -	Ditto - -	Entrance of the Thames - -	12	0
Tamarin-Town - - - -	Sneotora - -	Indian Ocean - - - -	9	0
Tees, River (Mouth) - - - -	England - -	German Ocean - - - -	3	0

## TIDES.

Names of Places.	Countries.	Coast.	High-Water.	
			H.	M.
Teneriffe, Island of - - -	Canaries - - -	Atlantic Ocean - - -	3	0
Texel, Island of - - -	Dutchland - - -	German Ocean - - -	7	30
Thames, River (Mouth) - - -	England - - -	Ditto - - -	1	30
Tinmouth - - -	Ditto - - -	Ditto - - -	3	0
Topsham - - -	Ditto - - -	English Channel - - -	6	0
Torbay - - -	Ditto - - -	Ditto - - -	5	15
Tory, Island of - - -	Ireland - - -	Western Ocean - - -	5	30
Valery, St. - - -	France - - -	English Channel - - -	10	30
Vannes - - -	Ditto - - -	Bay of Biscay - - -	3	45
Ushant, Isle of - - -	Ditto - - -	English Channel - - -	4	30
Waterford - - -	Ireland - - -	St. George's Channel - - -	6	30
Weymouth - - -	England - - -	English Channel - - -	7	0
Whitby - - -	Ditto - - -	German Ocean - - -	3	0
Wight, Isle of, North, South, East, and West End } - - -	Ditto - - -	English Channel - - -	0	0
Winchelsea - - -	Ditto - - -	Ditto - - -	0	45
Wintertonness - - -	Ditto - - -	German Ocean - - -	9	0
Yarmouth - - -	Ditto - - -	Ditto - - -	9	45
York Fort - - -	New Wales - - -	Hudson's Bay - - -	9	10
York, New - - -	United States - - -	Atlantic Ocean - - -	3	0
Youghall - - -	Ireland - - -	St. George's Channel - - -	4	30

The following times serve for coasts of considerable extent, and nearly for the places on those coasts; viz. Finmark, or N.N.W. coast of Lapland, 1<sup>h</sup> 30<sup>m</sup>; Jutland isles, 0<sup>h</sup> 0<sup>m</sup>; Friesland coast, 7<sup>h</sup> 30<sup>m</sup>; Zealand coast, 1<sup>h</sup> 30<sup>m</sup>; Flanders coast, 0<sup>h</sup> 0<sup>m</sup>; Picardy and Normandy coasts, 10<sup>h</sup> 30<sup>m</sup>; Biscay, Gallician, and Portugal coasts, 3<sup>h</sup> 0<sup>m</sup>; Irish west coast, 3<sup>h</sup> 0<sup>m</sup>; Irish south coast, 5<sup>h</sup> 15<sup>m</sup>; Africa west coast, 3<sup>h</sup> 0<sup>m</sup>; America west coast, 3<sup>h</sup> 0<sup>m</sup>; America east coast, 4<sup>h</sup> 30<sup>m</sup>.

The use of the preceding table is to find the time of high-water at any of the places contained in it: for this purpose, find the time of the moon's southing on a given day (see MOON); and then add the time which the moon has passed the meridian on the full and change days, to make high-water at that place; and the sum shews the time of high-water on the given day.

See on the subject of this article, Newton Princ. Math. lib. iii. prop. 24. and De System. Mundi, sect. 38-54. Apud Opera Ed. Horsley, tom. iii. p. 25, &c. p. 203, &c. Maclaurin's Account of sir I. Newton's Discoveries, book iv. ch. 7. Ferguson's Astron. ch. xvii. Robertson's Navig. book vi. sect. vii. viii. ix. Young's Lectures.

*TIDE-Dial*, the name of an instrument contrived by Mr. Ferguson, for exhibiting and determining the state of the tides. It is represented in *Plate IV. Dialling, fig. 36.* and the external parts of it consist of 1. An eight-sided box, on the top of which, at the corners, are shewn the phases of the moon at the octants, quarters, and full. Within these is a circle of 29½ equal parts, which are the days of the moon's age reckoned from the sun at new moon, round to the sun again. Within this circle is one of twenty-four hours, divided into their halves and quarters. 2. A moving elliptical plate, painted blue, to shew the rising of the tides under and opposite to the moon, with the words *high-water, tide-falling, low-water, tide-rising*, marked upon it. To one end of this plate is fixed the moon M by the wire W, which goes along with it. 3. Above this elliptical plate is a round one, with the points of the compass upon it, and also the names of above two hundred

places in the large machine (but only thirty-two in the figure, to avoid confusion) set over those points on which the moon bears when she raises the tides to the greatest heights at these places, twice in every lunar day; and to the north and south points of this plate are fixed two indices I and K, which shew the times of high-water, in the hour-circle, at all these places. 4. Below the elliptical plate are four small plates, two of which project out from below its ends at new and full moon; and so, by lengthening the ellipse, shew the spring-tides: the other two of these small plates appear at low-water when the moon is in her quadratures, or at the sides of the elliptic plate, to shew the neap-tides. When any two of these small plates appear, the other two are hid; and when the moon is in her octants, they all disappear. Within the box are a few wheels for performing these motions by the handle H. Turn the handle till the moon, M, comes to any given day of her age in the circle of 29½ equal parts, and the moon's wire W will intersect the time of her coming to the meridian on that day, in the hour-circle: the XII under the sun being mid-day, and the opposite XII mid-night: then looking for the name of any given place on the round plate (which makes 29½ rotations, whilst the moon M makes only one revolution from the sun to the sun again) turn the handle till that place comes to the word *high-water* under the moon, and the index which falls among the forenoon hours will shew the time of high-water at that place in the forenoon of the given day: then turn the plate half round, till the same place comes to the opposite high-water mark, and the index will shew the time of high-water in the afternoon at that place. And thus, as all the different places come successively under and opposite to the moon, the indices shew the times of high-water at them in both parts of the day; and when the same places come to the low-water marks, the indices shew the times of low-water. For about three days before and after the times of new and full moon, the two small plates come out a little way from below the high-water marks on the elliptical plate, to shew that the tides rise still higher about these times: about the quarters, the other two plates come out a little from under the low-

water marks toward the sun, and on the opposite side, shewing that the tides of flood rise not then so high, nor do the tides of ebb fall so low, as at other times. For the description of the inside work of this machine, and the method of constructing it, see Ferguson's *Astron.* p. 297.

**TIDE-Gage.** See **GAGE.**

**TIDE-Gates** are the lower gates of a lock open to a tide-way: these are also placed at the mouths of drains.

**TIDE-Mill**, in *Rural Economy and Agriculture*, an useful sort of mill, the moving power of which is formed by running a dam across an inlet where tide-water comes in, so as to leave a narrow passage open for placing it in on one side. It also signifies a mill for raising and clearing lands from tide-water in fen situations, and where injury is done by the overflowing of the tides. See **WATERING of Land.**

Tide-mills may mostly be formed without producing any obstruction or hindrance to agriculture.

**TIDE-Waiters**, or *Tide-Men*, certain officers belonging to the custom-house, appointed to watch or attend on ships coming from abroad, to see that nothing be landed till the customs be paid.

They are thus called, because they go aboard the ships at their arrival in the mouth of the Thames, and come up with the tide.

**TIDENS DORF**, in *Geography*, a town of Prussia, in the province of Ermeland; 4 miles S. of Frauenburg.

**TIDER**, or **NER**, a small island in the Atlantic, near the coast of Africa. N. lat.  $19^{\circ} 30'$ .

**TIDESWELL**, a small market-town in the hundred of High Peak, and county of Derby, England; is situated in a valley among bleak hills, 32 miles N.N.W. from the county-town, and 160 miles N.W. by N. from London. The town is reported to have received its name from an ebbing and flowing well, now hardly remembered, as it has long ceased to flow. The church, which was erected in the fourteenth century, is a handsome edifice of the conventual form, with a neat tower at the west end, terminated by eight pinnacles; those at the angles rising from octagonal bases, and being much higher than the intermediate ones. In the chancel is a small stone commemorative of John Foljambe, who died in 1358, and is said to have contributed much towards the building of the church. A raised tomb perpetuates the name of Sampson Meurill, who died in 1462, and who, in the course of two years, was engaged in eleven battles in France. Among other monuments of ancient date, is one to the memory of a native of this town, Robert Pursglove, prior of Gisburn priory, who obtained a pension from Henry VIII. for his obsequious compliance with that monarch's wishes, in not only surrendering his own house, but also acting as a commissioner to procure the surrender of others. In queen Mary's reign he was appointed archdeacon of Nottingham, and suffragan bishop of Hull; but on the accession of Elizabeth, he was deprived of all his spiritualities, and retired to Tideswell, where, having founded a grammar-school, and an hospital for twelve poor people, he died in 1579. By the population return of the year 1811, the inhabitants of this parish are stated to be 1219, who are chiefly supported by the mining business; the number of houses, which are mostly scattered on the opposite banks of a rivulet, was estimated at 283. A weekly market is held on Wednesdays; and here are three annual fairs.

In the vicinity of Tideswell is the sequestered retreat of Monsal-Dale, peculiarly eminent for picturesque beauty. Near the head of the Dale, the rocks jut out on the south

side, like the immense towers of a strong fortress. Lower down, the crags soften into verdure, the dale expands, and the eye dwells enraptured on the rich prospect that presents itself. The back-ground is formed by a steep precipice, variegated by short herbage and brushwood, with occasionally a starting rock breaking its continuity of surface. On the summit of an eminence called the Great Finn, was a large barrow, about 160 feet in circumference, chiefly composed of broken masses of limestone, to obtain which the barrow was destroyed about the year 1795. Within this tumulus various skeletons were discovered, two of them of gigantic size, with several urns, and other ancient memorials; among which were two arrow-heads of flint, whence the barrow is supposed to have been of very remote antiquity; for, as the learned author of "*Nenia Britannica*" observes, "flint arrow-heads are evidences of a people not in the use of malleable metal; and it therefore implies, wherever these arms are found in barrows, they are incontestably the relics of a primitive barbarous people, and preceding the era of those barrows in which brass or iron arms are found." It is worthy of note, that, excepting on the side next the precipice, the summit of the Great Finn is surrounded by a double ditch, with a vallum to each the distance between the banks is 160 yards.

Near the hamlet of Wormhill, in this parish, is a romantic and deep glen or dale, where the river Wye flows beneath a stupendous mass of rock, called *Chee-Tor*. This mass of freestone rises about 300 feet above the level of the river, and constitutes a most imposing and singular feature. At a small hamlet called Tunited, in the liberty of Wormhill, was born James Brindley, justly famed for his successful efforts in planning and executing canals. See **BRINDLEY**.—*Beauties of England and Wales*, vol. iii. Derbyshire; by J. Britton and E. W. Brayley. Davies's *Historical and Descriptive Account of Derbyshire*, 8vo. 1811.

**TIDEWA**, a town of Sweden, in West Gothland; 62 miles N.E. of Uddevalla.

**TIDLA**, a river of Sweden, which runs into the Wenner lake, near Mariestadt, in the province of West Gothland.

**TIDON**, a town on the east coast of the island of Celebes, in the bay of Gunong Tellu. N. lat.  $0^{\circ} 3'$ . E. long.  $120^{\circ} 38'$ .

**TIDOR**, or **TIDORE**, an island in the East Indian sea, and one of those called Moluccas, situated near the west coast of the island of Gilolo, between Ternate and Timor; about ten leagues in circumference, and so called from its capital, though named Tadura, or Daco, by the natives. It abounds in spices, especially cloves. The Dutch have several forts, but the island is governed by a king, who possesses likewise some territory on the island of Gilolo; 15 miles S.E. of Ternate. N. lat.  $0^{\circ} 42'$ . E. long.  $127^{\circ} 19'$ .

**TIDSI**, a river of Morocco, which discharges itself into the ocean a few miles S. of the Tegrewelt, or Cape Offam.

**TIEBAS**, a town of Spain, in the province of Navarre; 5 miles S.E. of Pamplona.

**TIEDEMAN**, **DIETERICH**, in *Biography*, a philosophical writer, was born April 1748, at Bremervorde, in the duchy of Bremen, and educated in the school of his native place in the Greek and Latin languages, in which he made very considerable proficiency. Devoting himself to the church, he removed to the school of Verden, and from thence to the Athenæum at Bremen, where he formed an intimate friendship with Meiners, afterwards professor at Göttingen.

Gottingen. In 1767 he settled at Gottingen, and here he renounced the study of theology, because he disapproved the system there taught, and applied to mathematics, classical literature, and philosophy. In the winter of 1769 he fixed his residence in Livonia, as tutor to a nobleman of that country; and whilst he was there, he published at Riga, in 1772, his "Essay on the Origin of Language." After visiting his native place in the following year, he went to Gottingen, and formed an acquaintance with the celebrated Heyne, who wrote a preface to his "System of the Stoic Philosophy," and persuaded him to publish it. By the recommendation of this learned friend, he was appointed professor of ancient literature in the Caroline college at Cassel, of which office he took possession in 1766. His intervals of leisure were employed in the study of philosophy and its history; and also in preparing for the press his "Investigation of Man," "The First Philosophers of Greece, &c." and his "Spirit of Speculative Philosophy." Upon the dissolution of the Caroline college in 1786, he occupied the chair of philosophy at Marburg, and his lectures were very popular. He was an opposer of Kant's philosophy: and he indulged himself in ridiculing the extravagant pretensions or pious arrogance of the founders of sects. Although his constitution was robust, he was carried off by a fever and inflammation of the lungs, in May 1803, at the age of 55. As a literary character, he was intimately conversant with the literature of Greece and Rome, and with all the systems of ancient and modern philosophy, as well as the manners and customs of ancient and modern times. His extensive erudition appears in his "Argumenta Platonis," annexed to the edition of Plato, printed at Deux-Ponts; in his prize essay, entitled "Disputatio de Quæstione quæ fuerit magicarum artium origo," and in various other dissertations. In philosophy he was in early life a dogmatist, and in the latter period of his life inclined to scepticism. His works, which, besides those already mentioned, were numerous, and relate chiefly to the history of philosophy, and its different systems, afford ample evidence of his assiduity and labour. Monthly Magazine. Gen. Biog.

**TIEFENSEE**, in *Geography*, a town of Prussia, on a lake of the same name; 20 miles S. of Brandenburg.

**TIEFF**, a town of Prussia, in the province of Bartenland; 7 miles S.E. of Angerburg.

**TIEFFENAW**, a town of Prussian Pomerelia; 15 miles S. of Marienburg.

**TIELLEN-HEAD**, a cape of the county of Donegal, on the west coast of Ireland. N. lat.  $54^{\circ} 41'$ . W. long.  $8^{\circ} 40'$ .

**TIEM**, a town of Asia, in the kingdom of Laos, on the Mecom; 90 miles S.S.E. of Lantchan.

**TIEN**, or **LIEN**, a city of China, of the second rank, in Quang-tong; 960 miles S. of Peking. N. lat.  $24^{\circ} 50'$ . E. long.  $111^{\circ} 49'$ .—Also, a town of Corea; 25 miles N.N.E. of King-ki-tao.—Also, a city of China, of the second rank, in Quang-si, on the north side of the Pofoi; 1120 miles S.S.W. of Peking. N. lat.  $23^{\circ} 46'$ . E. long.  $106^{\circ} 19'$ .

**TIEN-CHAN**, a town of Corea; 53 miles W.N.W. of Han-tcheou.

**TIENEN**. See **TIRLEMONT**.

**TIENGEN**, or **THIENGEN**, or *Thungen*, a town of Germany, in the principality of Klettgau, on the Wutach, formerly, with its district, constituting a lordship; 29 miles E. of Balo. N. lat.  $47^{\circ} 42'$ . E. long.  $8^{\circ} 17'$ .

**TIENHOVEN**, a town of Holland, on the Leck;

6 miles S. of Schoonhoven.—Also, a town of Utrecht; 7 miles N. of Utrecht.

**TIEN-SING**, a great port of China, on the river Pei-ho. Its Chinese name literally signifies "heavenly spot;" and in the time of Marco Paolo, when it is supposed to have been much larger than at present, it was called "Citta Celeste;" and it is said to have a claim on this appellation from its situation in a genial climate, fertile soil, dry air, and serene sky. It is the general emporium for the northern provinces of China, and is built at the confluence of two rivers, from which it rises in a gentle slope. The palace of the governor stands on a projecting point, commanding a broad basin, or expanse of water, produced by the union of the rivers, and almost covered with vessels of different sizes. These two rivers are the Pei-ho and the Yun-leang-ho, or grain-bearing river, from the quantities of wheat conveyed upon it from the province of Shan-sec, and sent up by the Pei-ho to the neighbourhood of Peking. Over these rivers, where they unite, is a bridge of boats: and along the quays were some temples and other handsome edifices, but the rest consisted chiefly of shops for the retail of goods, and also warehouses, together with yards, and magazines for maritime stores. The houses at Tien-sing are chiefly built of brick, of a leaden-blue colour. Few are red: the poorest are pale brown. Many of the houses are two stories high.

**TIEN-TCHA**, or *New Gibraltar*, a mountain of Cochinchina, which forms the harbour of *Turon*; which see.

**TIENTONG**, a town of Siam; 350 miles N.N.W. of Juthia.

**TIEN-TSANG**, a town of Thibet; 268 miles E.S.E. of Hami.

**TIEPOLO**, **GIOVANNI BATISTA**, in *Biography*, was one of the last of the eminent Venetian painters. He was born at Venice in 1697, and was a scholar of G. Lazzarini; but he afterwards studied the works of P. Veronese. He possessed a quick invention, and great freedom of hand, and was admirably qualified for the execution of large fresco works upon ceilings, &c.; where great facility of handling, and richness of colouring, will often apologize for the want of higher qualities, particularly in allegoric or grotesque subjects. Tiepolo was employed in many of the palaces in Italy, but most honoured by the employment he received from the king of Spain, who engaged him to adorn his palace at Madrid. He died at Madrid in 1770, at the age of 73. He etched many of his own designs with great neatness and taste.

**TIER**, in *Sea Language*, the name of the several ranges of guns mounted on one side of a ship's deck; which, according as they are placed on the lower, middle, or upper decks, are called the lower, middle, or upper tier.

**TIER of the Cable**, denotes a range of the fakes or windings of the cable, which are laid within one another in an horizontal position, so as that the last becomes the innermost.

**TIER Cable**, is the hollow space in the middle of a cable, when it is coiled.

**TIER**, in *Organ-Building*, is used to distinguish the different ranks or ranges of pipes (as a tier of guns in men of war) in the front of the instrument, and even in the interior of the case, when the compound stops have several ranks of pipes, as the sesquialter, furniture, and cornet.

**TIERBY**, in *Geography*, a town of Sweden, in the province of Halland; 6 miles S.E. of Helmstadt.

**TIERCE**, a town of France, in the department of the Mayne and Loire; 3 miles S. of Chateaufeuf.

**TIERCE**, or *Tierce*, in *Commerce*, a measure of liquid things,

things, as wine, oil, &c. containing the third part of a pipe, or forty-two gallons. See MEASURE.

The tierce is also a weight by which provisions are sold in Ireland. The tierces, barrels, and firkins are not tared, but the pieces in each cask must be of the following weight and number :

	lbs.		lbs.
<i>Beef.</i> — Navy	304	<i>per tierce, being</i>	38
			pieces of 8 each.
India	336	ditto	42
Mefs	304	ditto	38
Ditto	200	<i>per barrel</i>	25
Ditto	100	<i>per firkin</i>	25
<i>Pork.</i> — India	318	<i>per tierce</i>	53
Navy	320	ditto	80
Army	208	<i>per barrel</i>	52
Mefs	200	ditto	50
Ditto	100	<i>per firkin</i>	25

**TIERCE**, in *Music*, a 3d. The highest stop in an organ, called the tierce, is a major 3d above the 15th, every found being a 17th above the diapason. See THIRD.

**TIERCE de Picardie**, in *French Music*, and indeed all choral music of old masters in a minor key, is terminated with a sharp 3d, which the French now call *tierce de Picardie*, on account of the great number of cathedrals in that province, where it continues still in use.

Padre Martini (*Saggio di Contrap. parte prima*, 23.) recommends the terminating minor movements with a sharp 3d; a practice which Rousseau (*Dict. de Mus.*) censures as Gothic, and a proof of bad taste. If the first of these excellent writers wished only to preserve its use in the church, and the second to banish it elsewhere, they were both right, however their opinions may seem to clash. The learned author of the *Saggio di Contrappunto*, who was so perfectly acquainted with all the beauties and effects of choral music, is certainly more to be relied on in whatever concerns it, than the animated author of the *Dictionnaire de Musique*; who, with the most refined taste and exalted views with respect to dramatic compositions, had neither time nor opportunity sufficiently to explore the mysteries of canto fermo, or to become a very profound contrapuntist. For our own part, though we never wish to hear a song or glee in a minor key, and with a sharp 3d; yet there is something so solemn and grateful in these terminations of ecclesiastical compositions, that we should be very sorry if the practice were not continued. And if we consider the relation and composition of the several stops in an organ, we shall find, that as every single key in the chorus of that instrument has a complete chord with a sharp 3d to it, when we dwell on a chord with a flat 3d, while the tierce, cornet, sesquialter, and sometimes the furniture, are sounding the sharp 3d, it affords an additional reason for the origin and continuance of the practice, besides the peculiar properties of tonal modulation.

**TIERCE**, in *Gaming*, a sequence of three cards of the same colour.

**TIERCE**, in *Fencing*. See GUARD and THRUST.

**TIERCE Order**. See THIRD Order.

**TIERCE Point**. See THIRD Point.

**TIERCED**, **TIERCE**, in *Heraldry*, denotes the shield to be divided by any of the partition lines, party, coupy, tranchy, or tailly, into three equal parts, of different colours or metals.

If the chief and base be of the same colour when divided by a fesse, they blazon it by expressing the colour, and mentioning the fesse; otherwise, they say, it is *tierce*

in fesse, and mention each of the colours, or *tierce in pale*, if so divided in pale.

**TIERCEL**, in *Falconry*, a name given to a male hawk, as being a third part less in size than the female.

**TIERCELET**. See TASSEL.

**TIERDILL**, in *Geography*, a town of Hindoostan, in Vissapour; 20 miles W. of Galgala.

**TIERPIED**, a town of France, in the department of the Channel; 3 miles E. of Avranches.

**TIERRA**. See TERRA.

**TIERRA Bomba**, a small island near the coast of South America, at the entrance of the harbour of Carthagena; where, in 1741, the English erected a battery.

**TIERY**, a town of Sweden, in the province of Upland; 30 miles N. of Upsal.

**TIES**, aboard a ship, are those ropes by which the yards hang; and when the haliards are strained to hoist the yards, these ties carry them up.

**TIESSERBACH**, in *Geography*, a river of Wurtemberg, which runs into the Neckar, near Nurlingen.

**TIETAR**, a river of Spain, which runs into the Tagus, near Talavan, in Estremadura.

**TIE-TCHEOU**, a town of Chinese Tartary, in the country of Kokonor; 688 miles S.E. of Hami. N. lat. 33° 56'. E. long. 102° 54'.

**TIETE**, or **ANHEMBI**, a river of Brazil, which runs into the Parana.

**TIFACOU**, a word used by some of the chemical writers to express quicksilver.

**TIFATA MONS**, in *Ancient Geography*, a mountain of Italy, in Campania, near Capua. The table of Peutinger has placed here two temples, one designated by the words "Ad Dianam," the other by those of "Jovis Tifationus."

**TIFATA**, a town of Italy, in Latium. Pliny.

**TIFATUM**, a word used by some of the chemical writers to express sulphur.

**TIFER**, in *Geography*, a town of the duchy of Stiria; 3 miles S. of Cilley.

**TIFERNUM**, or **TIFERNUS**, in *Ancient Geography*, a river of Italy, in Samnium.

**TIFERNUM Metaurum**, a town of Italy, in Samnium. Livy.

**TIFERNUM Tiberinum**, or *Tifernum of the Tiber*, *Citta di Castello*, a town of Italy, in Umbria, to the N.W. towards the banks of the river Tiber. It was municipal.

**TIFESELT**, in *Geography*, a town of Fez; 12 miles N.E. of Sallee.

**TIFFAUGES**, a town of France, in the department of the Vendée; 9 miles E. of Montaigu.

**TIFFE de Mer**, in *Natural History*, a name given by count Marfigli to a species of sea-plant, as he supposes it to be, commonly but erroneously reckoned among the sponges, and called by authors a *branched sponge*. This author has called it by this name from its resemblance to the heads of the *typha palustris*, or cat's tail, when ripe in the month of September.

The sponges must be of a lax and cavernous texture; but this substance is smooth and firm, and has no inequalities on its surface, excepting a few short hairs, which give it a velvety look, when first taken out of the water. It is a very elegant and beautiful substance; it grows to two feet in height, and is very elegantly branched; it grows on rocks and stones, and, when first taken out of the sea, is full of a viscous water, as yellow as the yolk of an egg; but when this water is pressed out, and the substance dries, it loses its yellow, and becomes of a dusky-brown colour: it is very tough and firm while in the water, but when dry it usually

usually breaks of itself into little pieces, and may be crumbled to powder between the fingers. This is a very strong proof, among others, of its not being of the nature of the sponge.

When viewed by the microscope, the whole surface is found to be covered with extremely fine and slender hairs; and, among these, there is an infinity of little apertures, through which the sea-water makes its way.

When a branch of it is cut transversely, there are seen a number of long and fine canals, by means of which the water, received at these superficial apertures, is conveyed to its whole substance. Marfig. Hist. de la Mer, p. 82.

Substances of this kind are now known to be of animal and not of vegetable origin. See CORAL.

TIFFENETH, in *Geography*, a town of Prussia, in the province of Natangen; 10 miles S. of Brandenburg.

TIFFESCH, or TIFAS, anciently *Theveste*, a town of Algiers; 40 miles S. of Bona. N. lat.  $36^{\circ} 20'$ . E. long.  $7^{\circ} 40'$ .

TIFLISBERG, a mountain of Switzerland, between the cantons of Uri and Unterwalden.

TIGA, in *Ancient Geography*, a town of Africa, in Mauritania Cæsariana, near the coast of the Atlantic. Strabo.

TIGA, in *Geography*, a small island in the East Indian sea, near the north-west coast of the island of Borneo. N. lat.  $6^{\circ} 25'$ . E. long.  $112^{\circ} 14'$ .

TIGAON, an island in the Indian sea, near the north-west coast of the island of Borneo. N. lat.  $6^{\circ} 10'$ . E. long.  $128^{\circ} 48'$ .

TIGARA, in *Ancient Geography*, a town of Africa, in the interior of Mauritania Cæsariana. Ptol.

TIGAREA, in *Botany*, a barbarous or arbitrary name, of which its publisher Aublet has given no explanation.—Aubl. Guian. 917. Juss. 339. Lamarck Illustr. t. 826.—Schreber admitted the genus, under the name of *Rhinium*, in his Gen. 701, but in his *Addenda* to that work, 833, reduced it to *TETRAËTERA*; see that article. Mr. Pursh, however, has restored the genus and the name, in his *Flora America Septentrionalis*, 333, where he has, not without some doubt, referred hither a very curious new shrub, found in the meadows of the Rocky-mountains, and on the Columbia river, by the name of *T. tridentata*, t. 15. This has crowded, wedge-shaped, hoary, three-toothed leaves, and solitary, terminal, yellow flowers, the size of hawthorn-blossoms. That it is very distinct in genus from Aublet's *Tigarea* we have no doubt, being very nearly akin to the *Rubus japonicus* of Linnæus, *Corchorus japonicus* of Thunberg, as has lately been pointed out by M. De Candolle, in a paper read before the Linnæan Society. But it seems to us that the genus of neither of these shrubs can as yet be determined, for want of perfect fruit.

TIGAUDA, in *Ancient Geography*, a municipal town of Africa, in Mauritania Cæsariana, upon the route from Rufucurrum to Cala, between Castellum Tingitanum and Oppidum Novum. Anton. Itin.

TIGE, in *Architecture*, a French term for the shaft or fust of a column, comprehended between the astragal and the capital.

TIGEGUACU, in *Ornithology*, the name of a small Brazilian bird, of the size of a sparrow, and with a ridged and triangular bill, in which it resembles the mouche-rolle; its eyes are of a fine blue, and its legs and feet yellow; it is all over of a deep black, but that it has a large blood-red spot on the top of its head; its tail is short and black.

TIGELLIUS, in *Biography*, a musician, born in Sardinia, grandson of Phamea, a musician in great favour at Rome in the time of Julius Cæsar. Horace has handed him

down to posterity as a merciless spendthrift, and an egregious coxcomb.

“ Ambubajarum collegia Pharmacopolæ  
Mendici, Mimæ, Balatrones, hoc genus omne  
Mæstum, ac folicitum est cantoris morte Tigelli:  
Quippe benignus erat.”—Sat. lib. i. 2.

Tigellius was not only much in favour with Julius Cæsar, but afterwards with Cleopatra and Augustus: he was an able musician, an ingenious buffoon, and subtle courtier. What Horace has said of his caprice, has often been applied, and we fear will ever continue to be applied, to musicians of a similar disposition.

“ Omnibus hoc vitium ut cantoribus, inter amicos  
Ut nunquam inducant animum cantare rogati;  
Injussi nunquam desistant.”—Sat. lib. i. 3.

TIGENHAGEN, in *Geography*, a town of Prussian Pomerelia; 12 miles N. of Marienburg.

TIGENWIT, a town of Africa, in Negroland; 45 miles N. of Arguin.

TIGER, a small island in the Spanish Main, near the coast of Darien. N. lat.  $8^{\circ} 35'$ . W. long.  $77^{\circ} 30'$ .

TIGER, *Tigris*, in the Linnæan system of *Zoology*, is a species of cat, or *FELIS Tigris*; which see.

The tiger (formed of תִּיגַר, *façitta*, a dart, whence תִּיגַרִים) has its name from its supposed swiftness. See the article *FELIS Tigris*.

TIGER, *American*. See *FELIS Onca*.

TIGER-Cat. See *FELIS Capensis*.

TIGER, *Hunting*, or *Leopard*. See *FELIS Leopardus*.

TIGER, *Man*. See *MANTEGAR*.

TIGER-Shell, a name given to the red voluta, with large white spots.

In the Linnæan system, the tiger-shell is a species of the cypræa. See *SHELLS*.

TIGGREE, in *Geography*, a town of Hindooftan, in the circar of Sumbul; 17 miles S. of Nidjibabad.

TIGH, in our *Old Writers*, a clove or inclosure mentioned in ancient charters, and is still used in Kent in the same sense.

TIGHMAN'S ISLAND, in *Geography*, a small island in the Chefapeak. N. lat.  $38^{\circ} 48'$ . E. long.  $76^{\circ} 21'$ .

TIGHT, in *Sea Language*, expresses the quality by which a vessel resists the penetration of any fluid, whether compressing its surface, or contained within it. Hence a ship is said to be tight, when her planks are so compact and solid, as to prevent the entrance of the water in which she is immersed; and a cask is called tight, when the staves are so close, that none of the liquid contained in it can issue through or between them. In both senses, tight is opposed to leaky. Falconer.

TIGILLUM, a word used by some chemists to express the tile with which they cover the mouth of their crucibles; and, by others, for the crucible itself.

TIGILSKOI, in *Geography*, a town of Kamtschatka; 80 miles W. of Ukinzkoi. N. lat.  $57^{\circ} 20'$ . E. long.  $157^{\circ} 44'$ .

TIGINE. See *BENDER*.

TIGIS HERBA, in *Ancient Geography*, a town of Africa, in the interior of Mauritania Cæsariana, near a river, and S. of Icosium. In the Itin. of Anton. it is marked on the route from Rufucurrum to Scaldæ.

TIGLIUM, in *Botany*. See *PINEI Nuclei*, &c.

TIGNALE, in *Geography*, a town of the island of Corsica; 30 miles S.E. of Corte.

TIGNARES,

**TIGNARES**, a town of Brasil, and chief place in the captainship of Rio Grande.

**TIGNES**, a town of France, in the department of Mont Blanc; 3 miles S.E. of St. Maurice.

**TIGRA**, in *Ancient Geography*, a town of Lower Mæsia, on the route from Viminicum to Nicomedia, between Exantapristis and Appiaria. Anton. Itin.

**TIGRAH**, in *Geography*, a town of Hindoostan, in Bahar; 40 miles E.S.E. of Hajypour. N. lat. 25° 28'. E. long. 86° 7'.

**TIGRANA**, in *Ancient Geography*, a town of Asia, in the interior of Media. Ptol.

**TIGRANAAMA**, a town of Asia, in the Greater Armenia, and one of those which were situated to the E. of the sources of the Tigris. Ptol.

**TIGRANES**, the Great, in *Biography*, king of Armenia, after having been delivered by his father as a hostage to the Parthians, was liberated and assumed the crown about the year B.C. 93. Having formed an alliance with Mithridates, king of Pontus, against the Romans, he married Cleopatra, daughter of that prince; and, agreeably to the terms of his alliance, he reduced Cappadocia, and caused Ariarathes, the son of Mithridates, to occupy the throne instead of Ariobarzanes, who was supported by the Romans. Soon after this event, Tigranes was offered the crown of Syria, and accepted it B.C. 83; and when he had taken possession of the kingdom, governed it for many years by a lieutenant. He then invaded Lesser Armenia, and completely ruined it in the course of one campaign. Having made various other conquests, he founded the city of Tigranocerta, on the spot in Armenia where he had received the crown. He afterwards joined Mithridates, his father-in-law, in a war against the Romans; but when Mithridates, after having been defeated by Lucullus, took refuge in Armenia, he was coldly received by Tigranes, who granted him a castle for his residence, with a royal allowance. By a series of subsequent adventures, which proved successful, Tigranes was so elated, that he assumed the title of king of kings, and exacted from all who approached him tokens of the most humiliating reverence. A change however in his situation was rapidly approaching; for Lucullus, the Roman general, having reduced the kingdom of Pontus, availed himself of a preconcerted circumstance for marching in a hostile manner into Armenia, and laid siege to Tigranocerta. Tigranes advanced to its relief; but meeting with Lucullus at the head of a small army, an engagement ensued, the result of which was the pusillanimous flight of Tigranes, and the dispersion of his numerous army; and though he received considerable succour from Mithridates, and levied fresh troops, he could not prevent the surrender of Tigranocerta to Lucullus; and this surrender was followed by a signal defeat of the united forces of Mithridates and Tigranes; upon which the latter prince withdrew to the remotest part of his dominions. When Pompey succeeded Lucullus in the command of the Roman army, Mithridates and Tigranes, availing themselves of an interval of inaction, recovered Armenia and a great part of Pontus; but their success was interrupted by the rebellion of the son of Tigranes, who took up arms against his father; but being defeated, he sought refuge in Parthia, and persuaded Phraates, the sovereign of that country, to declare war against the Armenians. Phraates, with a numerous army under his command, compelled Tigranes to withdraw to the mountains, and besieged his capital Artaxata. The younger Tigranes being left in command of the Parthian army, was defeated by his father, who raised the siege of Artaxata. Tigranes afterwards joined

the Romans, and conducted Pompey into Armenia against his father. Unable to resist this invasion, he determined to surrender himself to Pompey, and to confide in his generosity. Upon being introduced to the presence of the Roman general, he took off his diadem, and prostrated himself at Pompey's feet. Pompey raised him, and replaced the royal diadem; and in compromising the dispute between the father and son, restored to the former the kingdom of Armenia, and the greatest part of Mesopotamia, but imposed upon him a fine of 6000 talents for making war upon the Roman people. He was also obliged to resign the crown of Syria, which he had held for eighteen years, and likewise the provinces of Cappadocia and Cilicia. From this time Tigranes was received as a friend and ally of the Roman people, and by maintaining their friendship, he was enabled to retain his dominions in peace to the end of his life, which terminated in the eighty-fifth year of his age. Anc. Un. Hist.

**TIGRANOCERTA**, SERED, in *Ancient Geography*, a town of Asia, in Greater Armenia, at some distance to the left of the Tigris, on the river Nicephorius, and N.W. of its mouth in the Tigris. This town was built by Tigranes, in the time of the Mithridatic war. According to Plutarch, it was large, handsome, populous, powerful, and rich. Tacitus reports that Tigranocerta was situated on an eminence, nearly surrounded by the Nicephorius, and that it was well fortified and garrisoned.

**TIGRE**, in *Geography*, a small island in the Pacific ocean, at the entrance into Amapalla bay. N. lat. 13° 10'. W. long. 88° 44'.

**TIGRÉ**, a province of Abyssinia, about 200 miles in length, and 120 in breadth. What in a special manner makes the riches of Tigré, is, that it lies nearest the market, which is Arabia; and all the merchandize destined to cross the Red sea must pass through this province, so that the governor has the choice of all commodities wherewith to make his market. The strongest male, the most beautiful female, the purest gold, the largest teeth of ivory, all must pass through his hand.

**TIGRIDIA**, in *Botany*, the *Flos Tigridis* of old authors, so called from its beautifully spotted corolla, resembling the skin of a tiger, or rather of a leopard or lynx. This fine Mexican plant, being known to systematic botanists from early engravings only, did not find a place in their arrangements, till Mutis sent a drawing of it to Linnæus, under the name of *Pavonia*, in honour of one of his ablest pupils, Pavon, as appears by his letters; and not, as some have supposed, because of any resemblance in the spots of the flower to a peacock's tail. Being judged a *Ferraria*, it was referred to that genus in the *Supplementum*; but Jussieu, and after him Mr. Gawler, has restored the genus of Mutis, under the above name, there being another PAVONIA, which the reader may see in its proper place.—Juss. Gen. 57. Gawler, (now Ker Bellenden,) in Sims and Kon. Ann. of Bot. v. 1. 246. Ait. Hort. Kew. v. 4. 137. (Ferraria; Lamarck Illustr. t. 569.)—Class and order, *Monadelphica Triandria*. Nat. Ord. *Enfateæ*, Linn. Gawler. *Irides*, Juss.

Gen. Ch. *Common Sheath* two-edged, of two compressed pointed valves; *partial* ones smaller, two-ranked, alternate, single-flowered. Perianth none. *Cor.* superior, regular, of six petals; the three outermost ovate-oblong, acute, concave at the base; slightly contracted towards the middle: three innermost much smaller, oblong-fiddle-shaped, pointed, convex, recurved, hastate at the base. *Stam.* Filaments three, firmly united into a triangular, abrupt, erect column, longer than the inner petals; anthers sessile at the top of the column,

column, erect, linear-oblong, acute, converging at the points, bursting externally. *Pist.* Germen oblong, abrupt, with three rounded angles; style thread-shaped, rather longer than the column of the stamens; stigmas three, slender, acute, deeply divided. *Peric.* Capsule oblong, bluntly triangular, abrupt and scarred at the top, of three cells and three valves, the partitions from the centre of each valve. *Seeds* numerous, nearly globose, ranged in a double row in each cell, somewhat angular from mutual pressure.

*Eff. Ch.* Common Sheath of two leaves. Calyx none. Petals six; the three inner ones smallest, fiddle-shaped, pointed. Stigmas linear, deeply cloven. Capsule of three cells, inferior.

1. *T. Pavonia.* Mexican Tiger-flower. Redout. Liliac. t. 5. Gawler n. 1. Ait. n. 1. (*Ferraria pavonia*; Linn. Suppl. 407. Willd. Sp. Pl. v. 3. 581. Cavan. Diss. 342. t. 189. f. 1. Andr. Repof. t. 178. F. Tigridia; Curt. Mag. t. 532. Ocoloxochitl, seu Flore Tigris; Hernand. Mex. 276. Tigridis flos; Dodon. Pempt. 693. Ger. Em. 122.)—Native of Mexico and Peru. Said to have been first introduced into the gardens of this country, about the year 1796, by Ellis Hodgson, esq. of Everton, near Liverpool, who liberally communicated it to the nurserymen about London, so that now few ornamental flowers are more easily obtainable. If treated as a greenhouse plant, like the Cape bulbs, the *Tigridia* flowers in spring, ripening abundance of seeds. If planted in the open ground in March or April, the more dry or sandy the soil the better, it will blossom in succession through the autumn, at the end of which the bulbs should be taken up, carefully dried, freed from their very succulent fibres, and preserved from frost till the following spring. Though each flower lasts but one day, as every plant bears several, a plentiful succession may readily be had. The root is an ovate bulb, which is eatable when roasted, tasting like a chestnut; from its base are sent down several long, perpendicular, tapering, very juicy, downy fibres. *Stem* two or three feet high, erect, round, leafy, somewhat branched. *Leaves* several, erect, sword-shaped, many-ribbed, plaited, smooth, a foot long. *Flower* inodorous, three or four inches broad, so splendidly variegated with scarlet, crimson, purple and yellow, that no description can do it justice. The ends of the larger petals are scarlet; their middle yellow; their base, like the whole surface of the smaller ones, richly spotted. *Stamens* and *pistil* red. It increases by bulbous offsets, as well as by seeds.

TIGRINI, ORAZIO, in *Biography*, a canon of Arezzo, who published at Venice, in 1588, a Musical Compendium; "Compendio della Musica," which he dedicated to Zarlino, from whom he received a letter of thanks for the laurel-crown with which he had bound his brows; which letter is prefixed to the work, with complimentary verses innumerable from other friends. This Compendium is not only well digested by the author, but rendered more clear and pleasant in the perusal, by the printer, who has made use of large Roman types, instead of Italic, in which most of the books that were published in Italy, before the present century, were printed. This author is the first, in our recollection, who has censured the impropriety and absurdity of composing music for the church upon the subject of old and vulgar ballad tunes. The cadences which he has given in three, four, five, and six parts, and which are good examples of ecclesiastical counterpoint, have been almost all used by Morley, without once mentioning Tigrini's name, either in the text or catalogue of authors whom he has cited. Zarlino, who had adopted the four new ecclesiastical tones proposed by Glareanus, was followed by Tigrini, with whom they seem to have stopped: as no more than the eight ancient tones ap-

pear afterwards to have been acknowledged by orthodox ecclesiastical composers; and Zarlino himself, in the last editions of his works, relinquished the idea of twelve modes: as no new harmony or modulation was furnished by the additional four to the contrapuntist, without violating the ancient rules of canto-fermo, which confine all its melody to the different species of octave. It appears from this Compendium, that *contrapunto alla mente*, or extemporary discant upon a plain-song, was still practised in the churches of Italy.

TIGRIS, in *Ancient and Modern Geography*, a large river of Asia, which has its source in the mountains of Greater Armenia, about 15 miles S. of the sources of the Euphrates, and pursues nearly a regular course S.E., until its junction with that river at Korna, 50 miles above Bassora. Formerly these rivers discharged themselves separately into the Persian gulf; but they now fall into the sea by a common canal, about 70 miles S. of Bassora. In the time of Pliny their separate beds might be seen. According to the same author, it was named "Deglito," from its source to mount Taurus, which it traversed; and from the place of its discharge on the other side of the mountain, to the sea or Persian gulf, it was called Tigris. This author says that it passed through the lake of Arethusa, without mixing its waters with those of the lake. Strabo and Arrian denominated the mouth of the Tigris "Pafitigris," and Pliny gives this name to that part of the river which separated into two arms, that, after enclosing an island, joined again, and fell into the same bed. Moses (Gen. ii. 14.) calls this river, as it has been supposed, Hiddekel. The cavern of mount Taurus, through which it is said to have passed, was called "Zoroanda;" and as a proof that it was the same river which entered the cavern and passed out of it, any substance thrown into the river on one side of the mountain was discharged by it on the other.

The ancient Persians called this river "Teer," the arrow, from the rapidity of its current; and it is now called "Degila," and "Shat-Bagdad," the river of Bagdad. The united rivers of the Tigris and Euphrates are denominated "Shat-ul-Arab;" which see.

The Tigris, though a far less noble stream than the Euphrates, is one of the most celebrated rivers in history; and many famous cities have, at different periods, decorated its banks; among which we may reckon, in ancient times, those of Nineveh, Seleucia, Ctesiphon; and in subsequent periods, those of Bagdad, Mosul, Diarbekir, &c.

This river is navigable for boats of twenty or thirty tons burthen as far as the mouth of the Odorneh, but no farther; and the commerce of Mosul is consequently carried on by rafts, supported by inflated sheep-skins. The rafts are floated down the river, and when arrived at Bagdad, the wood of which they are composed is sold without a loss, and the skins conveyed back to Mosul by camels. The Tigris is, on an average, between Bagdad and Korna, about 200 yards wide. The banks are steep, and, for the most part, overgrown with brush-wood, the haunt of lions and other wild beasts. The Tigris rises twice in the year; the first and great rise is in April, and is caused by the melting of the snows in the mountains of Armenia; and the other is in November, produced by the periodical rains. A boat, with a fair wind, will sometimes pass from Bagdad to Bassora in six days, but the common passage is from eight to ten.

The banks of the Tigris, from Tauka-Kelra to Korna, cannot boast of a single village, or even habitation, with the exception of Koot, a miserable place, containing 40 or 50 mud-huts. The city of Wafith, repeatedly mentioned in the Arabian histories, is no longer a place of any consequence; it stands on the banks of the Hye, or great canal. From Korna to the neighbourhood of Bassora, Bassara or

Barra, there is little or no cultivation; but from thence the country bordering on the banks of the river is covered with plantations of date-trees, which continue, without interruption, almost to the mouth of the Slat-ul-Arab.

**TIGRIS Fons**, a fountain of Asia, in the mountains S. of Maxoene, which formed a stream that ran towards the S.E. and discharged itself into the lake Arethusa.

**TIGRIS**, in *Geography*, a river of China, between Canton and the sea, so called by Europeans.

**TIGRIS**, in *Zoology*. See **FELIS Tigris**.

**TIGUAZALPA**, in *Geography*, a town of Mexico, in the province of Nicaragua, on a river which runs into Amapalla bay; 80 miles N. of Leon. N. lat.  $13^{\circ} 50'$ . W. long.  $87^{\circ} 36'$ .

**TIGUILLACA**, a town of Peru, in the diocese of La Paz; 10 miles N. of Puno.

**TIGURINI**, in *Ancient Geography*, a people of Gaul, who established themselves in a canton of the Helvetians, and who joined the Cimbri when they made an attempt to pass into Italy.

**TIGURINUS PAGUS**, one of the four cantons which composed the Helvetic confederacy; supposed to be Zurich.

**TIGUTIA**, a place of Italy, in Liguria, N.E. of Monilia.

**TIGY**, in *Geography*, a town of France, in the department of the Loiret; 12 miles S.E. of Orleans.

**TIHAN**, a town of Hungary; 20 miles S.W. of Stulweifenburg.

**TIHOL**, a bay on the S. coast of the island of Bourou. S. lat.  $3^{\circ} 44'$ . E. long.  $126^{\circ} 27'$ .

**TIHOL**, in *Natural History*, a name given by the people of the Philippine islands to a species of crane very frequent among them, and remarkable for its size, being taller than a man when it stands erect, and holds up its neck. They call it also sometimes *tipul*.

**TIIB, EL**, in *Geography*, a town of Persia, in the province of Chufistan, on the Ahuaz river; 70 miles N.W. of Toftar.

**TIJEGUACU-PAROARA**, in *Ornithology*, the name of a Brazilian bird, of the size of a lark; it has a short and thick beak, brown above and whitish below; its head, throat, sides, and the lower part of its neck, are of a fine yellow, variegated with red in the female, and all over of a perfect blood-red in the male; the upper part of the neck, and the whole back, are grey, with a mixture of brown; the wings are brown, tipped with white; the tail is of the same colour; and the sides of the neck, the breast, belly, and thighs, are white. Marggrave's Hist. Brasil.

**TIJEPIRANGA**, the name of a Brazilian bird of the sparrow kind. It is a little larger than the lark; its whole body, neck, and head, are of a very fine red or blood colour, and its wings and tail black.

There is another species also of this bird, which is of the size of a sparrow, and is of a blueish-grey on the back, white on the belly, and of a sea-green on the wings; the legs of this are of a pale grey. Marggrave's Hist. Brasil.

**TIJOLA**, in *Geography*, a town of Spain, in the province of Granada; 5 miles S.W. of Purchena.

**TIJOUCA**, a cultivated valley of the Brazils, in the vicinity of Rio de Janeiro, situated, as it were, in the bottom of a funnel, being surrounded on all sides by mountains, excepting to the southward, where a small opening admits an arm of the sea. The valley is watered by a clear stream, precipitated down a steep and broad rock of granite, forming a magnificent cascade. The soil requires little labour of cultivation: indigo, manioc, coffee, cacao or chocolate

trees, sugar-canes, plantains, and orange and lime-trees growing promiscuously, and some spontaneously, in the space of twenty square yards. Coffee and indigo claim the chief attention. The temperature of the valley is very hot, on account of its confined situation and the reflection of the mountains. Fahrenheit's thermometer in the shade about four in the afternoon stood at  $88^{\circ}$ . Stanton's Emb. to China, vol. i.

**TIIZ**, or **TIZ**, a town of Persia, in the province of Meeeran, at the mouth of the Kurene; 75 miles S. of Kidge. N. lat.  $25^{\circ} 25'$ . E. long.  $60^{\circ} 24'$ .

**TIKAX**, a town of Mexico, in Yucatan; 68 miles S. of Merida.

**TIKE**, the Zetland name for an otter, of which there are many to be found about that island. Phil. Trans. N<sup>o</sup> 473, sect. 8.

**TIKE** is also used for a small bullock or heifer, for a particular sort of worm, and in Scotland for a dog.

**TIKIOB**, in *Geography*, a town of Denmark, in the island of Zealand; 4 miles S.W. of Helsingoor.

**TIKITHOCKTHOCK**, a settlement on the E. coast of Labrador. N. lat.  $56^{\circ} 15'$ . W. long.  $60^{\circ} 5'$ .

**TIKOO**, a town of Bengal; 30 miles S.W. of Ramgur. N. lat.  $23^{\circ} 29'$ . W. long.  $84^{\circ} 55'$ .

**TIKOTSCHIN**, a town of the duchy of Warsaw; 24 miles N. of Bilesk.

**TIL**, a town of Persia, in the province of Adirbeitzan; 60 miles N.W. of Tauris.

**TILA NAVI**, one of the Lipari islands; 6 miles S.S.W. of Stromboli.

**TILAMUNGALUM**, a town of Hindoostan, in Myfore; 5 miles S. of Ouffoor.

**TILBORG**, a town of Brabant, celebrated for its manufacture of cloth; 10 miles S. of Bois-le-Duc.

**TILBURREAH**, a town of Bengal; 30 miles N.N.E. of Doeca.

**TILBURY**, a township of Upper Canada, near lake St. Clair.

**TILBURY**, *West*, a village and parish in the hundred of Barstable, and county of Essex, England; is situated 24 miles S. by W. from Chelmsford, and 27 E. by S. from London. It appears to have been an episcopal seat of Cedda, bishop of the East Saxons, who in the 7th century propagated the Christian religion in this county, and built churches in several places, but "especially," as Bede reports, "in the city, which, in the language of the Saxons, is called Ythancestre; and also in that which is named Tilburgh (the first of which places is on the banks of the river Pant, the other on the banks of the Thames), where gathering a flock of servants of Christ, he taught them to observe the discipline of a regular life, as far as those rude people were then capable." Ythancestre is supposed to have stood at the mouth of the river Pant, or Blackwater, but has been entirely engulfed by the sea. Tilbury is now only a small village, containing, as the return of the year 1811 states, 44 houses and 117 inhabitants. A medicinal spring was discovered here in the year 1727, of great efficacy in cases of hæmorrhage, feurvy, and some other disorders. (See *TILBURY-Water*.) The marshes in this, and the contiguous parishes, are chiefly rented by the grazing butchers of London, who generally flock them with Lincolnshire and Leicestershire wethers, which are sent hither about Michaelmas, and feed till Christmas, when they are conveyed to the metropolis for sale.

On the banks of the Thames, in this parish, is Tilbury-Fort, originally built as a kind of block-house by Henry VIII., but enlarged into a regular fortification by Charles II., after the Dutch had failed up the river in the

year

year 1667, and burnt three English men of war at Chatham. Various additions have been since made; and it is now strongly garrisoned, and defended by a great number of guns. Some traces of the camp formed here to oppose the threatened invasion of the Spanish armada, in the time of Elizabeth, are yet visible.—*Beauties of England and Wales*, vol. v. Essex; by J. Britton and E. W. Brayley.

**TILBURY-Water**, in *Medicine*, is an acidulous or saline water, issuing from a spring situated near a farm-house at West Tilbury, near Tilbury-Fort, in Essex. This water is of a straw-colour, soft and smooth to the taste, but leaving, after agitation in the mouth, a small degree of roughness on the tongue; it throws up a scum variegated with several colours, which feels greasy; and effervesces with spirit of vitriol; it mixes smooth with milk, but curdles with soap; when boiled, it turns milky, but is fined by a fourth part of mountain-wine, and by acids; it operates chiefly by urine, though it is somewhat purgative, and increases perspiration. This water is esteemed for removing glandular obstructions, and hence is also recommended in scurvy and cutaneous diseases; it is good in bloody fluxes, purgings, and the like: in disorders of the stomach arising from acidity, in the gravel, fluor albus, and immoderate flux of the menses. As a diuretic, it is beneficial in dropical complaints. It gently warms the stomach, strengthens the appetite, and promotes digestion. The usual dose is a quart a-day. This water is supposed to owe its virtue to a native alkaline salt, which may be obtained from it by evaporation, and to its fixed air, which, however, being very volatile, soon exhales when the water is heated or stands for some time exposed. Elliot's Account of Mineral Waters, &c. p. 220.

**TILCARA**, in *Geography*, a town of South America, in the province of Tucuman; 32 miles N.N.W. of St. Salvador de Jujui.

**TILDIZ DAGHI**, a mountain of Asiatic Turkey; 10 miles S. of Tocat.

**TILE**. See **TYLE**.

**TILES**, *Draining*, in *Agriculture*, such as are made of particular forms and dimensions, for the purpose of draining and taking away the water that stagnates in or upon land. They are said to constitute a very neat and convenient, as well as cheap and beneficial material for this use in a great many cases, especially as they are exempt from the common duties on ordinary tiles and bricks. They have the advantage too of being capable of being laid with much facility and dispatch, and of requiring less cutting than in the methods usually had recourse to in the common practice of freeing land from wetness. They are made and employed in some districts, as Cheshire, &c. with complete success and much utility.

**TILE-Earth**, that sort of earthy material of the strong clayey kind which is used in the making of tiles. It is also a term in farming which is sometimes employed to signify a strong, stiff, stubborn sort of land or soil that cannot be brought into cultivation, and be managed without very great labour, trouble, and expence, but which, when once reduced and got into order, is, in some cases, very productive and lasting in its returns.

Vast strength of men and teams is often requisite in working such lands as farms, as they cannot be effectually improved and got into a proper state, except by the application and incorporation of large quantities of different proper rich earthy and other suitable substances.

The farmer should always calculate well before engaging farms consisting greatly of this sort of land or soil.

The general opinion among the most attentive and diligent farmers in the county of Essex is, that even the

pasture lands upon the wet, cold, tile-earth bottoms, should be kept under the plough two or three years in twenty, in order to render them in the most suitable and productive state.

**TILE**, or *Tyle*, in *Affaying*, a small flat piece of dried earth, used to cover the vessels in which metals are in fusion.

These are made of a mixture of clay and sand, or powder of flints, or broken crucibles, made into a paste, and spread thin with a rolling-pin, on a table or flat stone. From these cakes or plates, pieces are to be cut with a knife, to the shape and size of the mouths of the vessels to be closed. It is best then to pare away the borders of the under surface of the piece thus cut off, that this surface may immediately touch all the way the edge of the mouth of the vessel, leaving a prominent rim, by which means the tile fits close upon the vessel, and is not so easily displaced by accidents, as a touch of the poker, or of the coals put on to mend the fire, as it otherwise would be. Finally, put on the middle of the outer surface a small bit of the same matter, which serves as a kind of handle, by means of which it may be conveniently managed by the tongs, and easily taken off and put on again at pleasure. Cramer, Art. Aff. p. 66.

**TILENUS, DANIEL**, in *Biography*, a doctor and professor of theology at Sedan, in France, was born in Silesia, in 1563, and was the first foreigner who wrote against Arminius, though he afterwards changed his opinion and supported the doctrine of that theologian. He also took part in a violent controversy with Du Moulin. A reconciliation was attempted between the disputants, in which the elector palatine, the duke de Bouillac, and king James I. of England, interposed; and a national synod of the French churches was held for this purpose at Tonneins in 1614. The attempt to produce a pacification failed; and Tilenus was deprived of his professorship in 1619 or 1620. He then removed to Paris, and afterwards maintained for five days, at Orleans, a disputation with John Cameron on grace and free-will. In a letter addressed to the people of Scotland, he accused the Presbyterians of introducing too many changes in the form of their religion, and praised the people of England for admiring episcopacy. King James I. caused this letter to be printed, and invited the author to England, with an offer of a pension. Tilenus accepted the offer; but returning to France in order to arrange his affairs, an outcry was in the meanwhile raised against him in England, and he therefore determined to remain at Paris, where he died in 1633. He was the author of many works in Latin and French, which it is needless to recite. Gen. Biog.

**TILGUN**, in *Geography*, a town of Asiatic Turkey, in Caramania; 36 miles E.N.E. of Akshehr.

**TILHARA**, a town of Hindoostan, in Rohilcund; 30 miles S.S.E. of Bereilly.

**TILIA**, in *Botany*, the Lime-tree, or Linden-tree, an ancient Latin name, whose origin may perhaps be found in the Greek *πτελεα*, the *Elm*; but on this subject nothing certain, nor indeed very plausible, has been made out by etymologists.—Linn. Gen. 267. Schreb. 355. Willd. Sp. Pl. v. 2. 1161. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 299. Venten. in Sims and Kön. Ann. of Bot. v. 1. 207. Sm. Fl. Brit. 571. Prodr. Fl. Græc. Sibth. v. 1. 362. Pursh 362. Juss. 292. Tourn. t. 381. Lamarck Illustr. t. 467. Gært. t. 113.—Class and order, *Polyandria Monogynia*. Nat. Ord. *Columnifera*, Linn. *Tiliaceæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, concave, coloured, deciduous segments, about as large as the corolla. *Cor.* Petals five, alternate with the calyx, oblong, obtuse, crenate at the summit. Nectary a scale at the base of each petal, not universal. *Stam.* Filaments nu-

merous, thread-shaped, the length of the corolla; anthers of two nearly orbicular divaricated lobes, bursting outwards. *Pist.* Germen superior, roundish; style thread-shaped, the length of the stamens; stigma obtuse, with five angles. *Peric.* Capsule globose, angular, coriaceous or membranous, bursting tardily at the base, of five valves and five cells. *Seeds* solitary, roundish.

*Obs.* Two or three of the cells are generally abortive and obliterated. The nectary seems confined to the American species.

*Eff. Ch.* Calyx in five deep segments, deciduous. Petals five. Capsule superior, roundish, angular, of five cells, and five valves.

An important genus, of useful, as well as ornamental, hardy deciduous trees. The bark serves for cordage, and for those very serviceable mats, manufactured in Russia, so well known to our gardeners, and so useful for packing. The smooth, soft, white, close-grained wood is esteemed by carvers, and was preferred by the inimitable Gibbons, for those festoons of flowers, fruit, dead game, &c. with which his free and expeditious hand adorned most of the great houses in England. The leaves are sometimes given to cattle in seasons of scarcity in the North. The whole plant abounds with mucilage, and the sap is reported to afford some sugar. Nothing is more deliciously fragrant than the flowers of the whole genus, which bees frequent in great numbers, as they yield plenty of honey.

Section 1. *Flowers without the scaly nectaries.* European species.

1. *T. europæa.* Common Smooth Lime-tree. Linn. Sp. Pl. 733. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 610. Fl. Dan. t. 553. (*T. platyphyllos*; Scop. Carn. v. 1. 373? Venten. n. 2. *T. vulgaris platyphyllos*; Bauh. Hist. v. 1. p. 2. 133. Raii Syn. ed. 2. 316. *T. fœmina*; Ger. Em. 1483.)—Nectaries none. Capsule coriaceous. Leaves heart-shaped, undivided; smooth and somewhat glaucous beneath, with the branching of their veins woolly. Branches and footstalks smooth.—Native of woods and the borders of meadows, or the slopes of hills, in various parts of Europe, from Sweden to Greece, flowering early in July. A tall upright tree, with smooth, spreading, round branches, green when tender, afterwards brown. Leaves alternate, on longish stalks, pointed, sharply serrated, almost orbicular, about three inches in diameter, entire at the base, and their sides rather unequal or oblique in that part: their upper surface of a full bright green, quite smooth: under paler, somewhat glaucous, with a yellowish prominent midrib, and several other ribs, either opposite from the central one, or radiating from the base, subdivided, connected by parallel transverse veins, all smooth as well as the surface of the leaf, except at the base of each side-rib, where is a small, depressed, axillary, fringe-like tuft of hairs. *Stipulas* none. *Flower-stalks* axillary, solitary, shorter than the leaves, smooth, slender, each bearing an irregular umbel or cyme of yellowish flowers, and very remarkable for a large, solitary, oblong, obtuse, entire, veiny bractea, of a pale greenish hue, and smooth surface, united firmly to the stalk, and falling off with it. The germen is very woolly. Capsule obovate, or angular, especially when it ripens more than one seed, which is not often the case. The flowers are delightfully fragrant, especially at night. This is the kind of Lime most usually planted for avenues, nor can any thing be more desirable for that purpose. It appears to have taken place of our more ancient elms in king William's time, when also it was equally popular in France. The branches naturally feather down to the ground, but will bear clipping without injury. The leaves fall perhaps the first of all our native

trees, especially in the squares of London, where the Lime nevertheless bears the smoky atmosphere tolerably well. Whether the *T. ulmifolia*, *femine hexagono* of Merrett, mentioned by Dillenius in his edition of Ray's *Synopsis*, 473, be a variety of this, with more perfect fruit, or of any other species, we have no means of determining.

2. *T. corallina.* Red-twigged Downy Lime-tree. (*T. europæa*  $\beta$ ; Ait. Hort. Kew. ed. 1. v. 2. 229. ed. 2. n. 1.  $\gamma$ ; Fl. Brit. n. 1. *T. grandifolia*; Ehrh. Arb. n. 8. *T. foliis molliter hirsutis, viminibus rubris, fructu tetragono*; Raii Syn. ed. 2. 316.)—Nectaries none. Capsule coriaceous. Leaves heart-shaped, undivided; downy beneath, with the branching of their veins woolly. Branches and footstalks downy.—Native of various parts of Europe. Plentiful in Stoken-church woods, Oxfordshire, where it was first noticed by Bobart, and where its shining red twigs are very conspicuous. This character, however, is not invariable. We have the same species in Norfolk with brown twigs, and it seems to be often planted indifferently with the former. They have not yet been separated as species, nor did Ehrhart, in publishing the present under the appellation of *grandifolia*, mean any thing further than to distinguish it, in common with the foregoing, from his *parvifolia*, hereafter described. We therefore prefer an older and less ambiguous name. Professor Mertens, who has studied these trees in Germany, observes that *corallina* flowers a fortnight earlier than *europæa*. As to their specific difference, it appears chiefly to depend on the fine soft hairs, which clothe the backs of the leaves, and especially cover their ribs, fringing their minutest veins in a delicate and regular manner. These hairs are condensed into little axillary tufts, at the origin of each principal vein. In the *inflorescence* or *flowers* we perceive no material difference. The capsule has four or five angles. The famous old Lime in the church-yard of Zedditz near Guttenberg, in Bohemia, which is said to have borne hooded leaves, since a parcel of monks were hanged upon it, proves, by an authentic specimen sent us by professor Jacquin, to be this species, not the foregoing.

3. *T. parvifolia.* Small-leaved Lime-tree. Ehrh. Arb. n. 36. Pl. Off. n. 125. Sm. Engl. Bot. t. 1705. Ait. n. 2. "Schkular Handb. v. 2. 72. t. 141." (*T. microphylla*; Venten. n. 1. Sav. Etrusc. v. 1. 152. *T. europæa*  $\beta$ ; Fl. Brit. n. 1. *T. ulmifolia*; Scop. Carn. v. 1. 374. *T. sylvestris*; Trag. Hist. 1111. *T. folio minore*; Bauh. Hist. v. 1. p. 2. 137. Raii Syn. ed. 2. 316. *T. bohémica*, &c.; Till. Pif. 165. t. 49. f. 3.)—Nectaries none. Capsule roundish, very thin. Leaves heart-shaped, sharply serrated, somewhat lobed; smooth and glaucous beneath, with dense, axillary or scattered, tufts of hair.—Native of Germany, Carniola, Switzerland, Italy, France, and England. Ray says it frequently occurs in Effex and Suffex, as well as Lincolnshire and elsewhere. It flowers a month later than even the first species, not being in full perfection before August. The leaves are but about half the size of either of the foregoing, their serratures sharper, tufts of axillary hair larger, and often accompanied by large hairy blotches. Footstalks slender, and often of a longer proportion, quite smooth. Flowers smaller, smelling like a Honey-suckle. Capsule small, roundish, scarcely angular, rarely perfecting more than one seed, its coat thin and tender compared with either of the former species, on which circumstance M. Ventenat chiefly founded its distinctive character. We do not find that part so unlike them in firmness, as in thickness; but we have no doubt of the species being perfectly distinct. By planting this intermixed with the others about houses, in avenues, &c. a longer

## TILIA.

longer successions of fragrance from their blossoms might be obtained.

SECT. 2. *Flowers with scaly nectaries.* American species.

4. *T. americana.* Broad-leaved Lime-tree. Linn. Sp. Pl. 733. Willd. n. 2. Ait. n. 3. (*T. glabra*; Venten. n. 3. "Mem. de l'Inst. v. 4. 9. t. 2." Pursh n. 1. *T. canadensis*; Michaux Boreal-Amer. v. 1. 306.)—Nectaries present. Leaves orbicular-heart-shaped, abrupt with a point, sharply serrated; their veins minutely hairy beneath. Petals abrupt, crenate. Capsule ovate, somewhat ribbed. In the woods of Canada and the northern United States, and on the mountains, as far as South Carolina, flowering in May and June. It is known by the name of Lime-tree or Line-tree, Bass-wood, or Spoon-wood, and is both useful and ornamental. *Pursh.* Kalm first made the plant known to Linnæus, and it was supposed by them to be the only American species of *Tilia*. The stem is said to be eighty feet high. The branches are brown, smooth. Leaves larger than any of our European species, and of a more orbicular or rather elliptical form, abrupt rather than heart-shaped at their base; of a fine green above, turning red in autumn; much paler beneath; finely veined and smooth on both sides, except that all their veins are minutely hairy (not fringed like *T. corallina*) beneath, and even the smaller ones, as well as the larger, are furnished with little axillary hairy tufts. *Flowers* corymbose; their common stalk about twice the length of the footstalks. *Petals*, according to Ventenat, abrupt, and toothed towards the end. We have not examined the flowers.

5. *T. lasiflora.* Panicked Lime-tree. Michaux Boreal-Amer. v. 1. 306. Pursh n. 2.—"Leaves heart-shaped, taper-pointed, sparingly toothed, membranous, smooth. Panicles loose. Petals emarginate, shorter than the style. Capsule globose."—Near the sea-coast, from Maryland to Georgia, flowering in May and June. A very distinct species, though generally confounded with the foregoing one. *Pursh.*

6. *T. pubescens.* Hoary Lime-tree. Ait. n. 4. Willd. n. 3. Venten. n. 4. "Mem. de l'Inst. v. 4. 10. t. 3." Pursh n. 3.—Nectaries present. Leaves heart-shaped, pointed, coarsely serrated; abrupt and unequal at the base; downy beneath. Panicles forked, compound. Petals acute.—In close copies, and on the banks of rivers, from Virginia to Georgia, flowering from May to July. *Pursh.* Its thinner-leaved variety was long ago brought from Louisiana to the Paris gardens, and Jussieu gave it the name of *multiflora*, which is very apt, but has never been published till lately. Catesby is reported to have introduced this species into England before the year 1726. If our memory does not deceive us, it is to be met with at Bultrode, and in other old plantations, and the flowers are more highly fragrant than any others of the genus. Its growth is said not to be so lofty as that of *T. americana*. The leaves are smaller, obliquely heart-shaped, with very broad and pointed serratures; their under side extremely soft to the touch, but not white, though paler than the upper, and somewhat hoary. There are scarcely any axillary tufts of hair to the veins, except on the older denuded leaves. *Flower-stalks* twice as long as the footstalks, branched at the top into a forked, spreading, downy panicle of numerous flowers. The petals are rather pointed, as Ventenat describes them; and not emarginate, as in his and Pursh's specific definition. We readily concur with these authors, that the Louisiana tree, called *multiflora*, is a mere variety, and but a slight one. Our description of the inflorescence and flowers is taken from this variety. It is hardly necessary to mention

that all these American Lime-trees bear the same peculiar sort of bractea as those of Europe.

7. *T. alba.* White Lime-tree. Ait. n. 5. Willd. n. 4. "Waldst. et Kitaib. Hung. t. 3." Jacq. Hort. Schoenbr. v. 3. 18. t. 283. (*T. rotundifolia*; Venten. n. 5. "Mem. de l'Inst. v. 4. 12. t. 4.")—Nectaries present. Leaves deeply heart-shaped, obscurely lobed, sharply serrated; downy and white beneath.—Native of woods in Hungary. *Willdenow.* Found by Bruguière and Olivier near Constantinople. *Ventenat.* It was erroneously reported by our gardeners to come from America, as every new plant, at one period, was supposed to do. More recently, every novelty has been attributed to Botany Bay.—This is a hardy tree in England, but does not flourish so well as any of the preceding. The deep, and more even, heart-shaped figure of the leaves, and their snow-white under surface, readily characterize this species. Its light-yellow, cymose or panicled flowers are said to have the scent of a jonquill.

8. *T. heterophylla.* Various-leaved Lime-tree. Venten. n. 6. "Mem. de l'Inst. v. 4. 16. t. 5." Pursh n. 4. (*T. alba*; Sm. Inf. of Georgia, v. 1. 21. t. 11?)—"Leaves ovate, sharply serrated; white and downy beneath; either heart-shaped, or obliquely, or equally, abrupt, at the base. Capsule globose, obscurely ribbed."—On the banks of the Ohio and Mississippi, flowering in June. A very handsome and desirable ornamental tree. *Pursh.* Ventenat says it is distinguished from the last by many characters. The young branches, and buds, are smooth, of a purple colour inclining to black. Leaves delicately serrated, pointed, with tufts of reddish axillary hairs to the veins. *Flower-stalks* almost as long as the leaves, being thrice the length of *T. alba*. We have seen no specimen of this species, but it has probably been introduced into the gardens by some of our collectors from America. It is extremely likely to be the Warhew of Mr. Abbot, in our Insects of Georgia, t. 11.; which from the above-mentioned error of the gardeners respecting *T. alba*, we supposed could be no other than that species, now known not to grow in America. The Warhew is said to be very like the European Lime-tree, except being always a low bush or shrub. Mr. Abbot's figure answers so well to Ventenat's and Pursh's definitions, as to leave scarcely a doubt on the subject, except only that the latter speaks of *T. heterophylla* as an ornamental tree. It may attain a greater size in one part of the country than in another.

We feel much regret in rejecting our late esteemed correspondent M. Ventenat's supposed improvements in the nomenclature of the species of *Tilia*. But besides their appearing to us uniformly for the worse, as usual in all such alterations that ever came in our way, we greatly prefer established names; which though occasionally erroneous or ambiguous, have generally acquired associations that compensate for any defects.

*TILIA*, in *Gardening*, contains plants of the ornamental tree kind, among which the species mostly cultivated are, the European lime-tree (*T. europæa*); the broad-leaved American lime-tree (*T. americana*); the pubescent Carolina lime-tree (*T. pubescens*); and the white lime-tree (*T. alba*).

The first sort, though little used, is a handsome tree, having a smooth taper straight trunk, and the branches forming a beautiful cone. The foliage also is smooth and elegant: it grows to a very large size, and affords good shade: it makes a fine detached object in parks and open lawns, planted singly: the branches are so tough as seldom to be broken by the winds, and the flowers have a delightful fragrance: the wood is soft, but capable of being turned into

light

light bowls and dishes, &c. There are several varieties of it, as the narrow-leaved, the broad-leaved, the elm-leaved, the red-twigg'd, the smooth small-leaved, the smooth large-leaved, the soft hairy-leaved, the wrinkled-leaved, and the striped-leaved.

*Culture*.—These trees may be increased by seeds, layers, and cuttings. The seed, when ripe in the autumn, should be beaten down, keeping the green-twigg'd and red-twigg'd sorts separate; and be sown soon after, or preserved dry and sown till spring; sowing it in a bed or border of common earth; previously digging the ground, and dividing it into four-feet wide beds; drawing the earth off the surface evenly, about an inch deep, into the alleys; then sowing the seeds thinly, touching them lightly down into the earth with the back of the spade, directly earthing them over to the above depth.

When they come up in the spring, the beds should be kept clean from weeds, giving moderate waterings in dry weather, to forward the plants in growth as much as possible, in order to be fit for planting out in nursery-rows by the autumn or spring following; though, if they have shot rather weakly, they should stand another year, then be planted out in rows two feet and a half asunder, by eighteen inches distance in the lines, to remain three or four years or more to acquire a proper size for the purposes intended, trimming off the large side-branches from the lower part of the stem occasionally, to encourage their aspiring more expeditiously at top, which should be suffered to remain entire: these trees, when raised from seed, generally assume a more handsome and expeditious growth than such as are raised from layers and cuttings. When they are from about five or six to eight or ten feet high, they are of proper size for final planting out; though, when designed as forest-trees for timber, it is advisable to plant them finally while they are young, as not more than from three or four to five or six feet high.

They are all raised readily by the layer method; and for this purpose proper stools must be prepared, and the young shoots of a year or two old are the proper parts for being laid down, which should be performed in autumn or winter, by slit-laying, shortening the tops of each layer within a little of the ground: they are mostly rooted by the autumn following, and fit to plant out in nursery-rows, being then managed as the seedlings.

When cuttings are employed, the strong young shoots of the year should be chosen in autumn or spring, and planted in a moist good soil; or any scarce sorts may be planted several together in pots, and plunged in a hot-bed, as they more readily strike root in that way.

These two last methods are the proper ones for raising the varieties with certainty.

These trees are of a quick handsome growth, and succeed in almost any soil and exposure. They are some of them employed for their fine appearance, others for the exquisitely sweet smell of their flowers, and most of them for the use of their wood. The plants of them are also occasionally made use of in forming hedges in particular situations, but they are not by any means well calculated for this purpose.

As timber trees, their wood is found highly valuable on account of its softness, lightness, and toughness, for the making of various sorts of household utensils, as bowls, basons, &c. as well as for different purposes in the business of carving, gilding, turniog, spinning, &c.

All these trees afford ornament and variety among other deciduous trees in the shrubbery, plantations, &c.

TILIACEÆ, in *Botany*, a natural order of plants, the seventy-ninth in Jussieu's system, or the nineteenth of his thir-

teenth class, of which *Tilia*, the Lime-tree, is an example. See GERANIA for the full characters of this thirteenth class. Those of the order in question are thus given.

*Calyx* either of many leaves, or in many deep segments. *Petals* definite, distinct, (wanting in *Sloanea*,) alternate with the segments or leaves of the calyx, and for the most part agreeing with them in number. *Stamens* generally indefinite in number, and distinct. *Germen* simple. *Style* frequently solitary, rarely either multiplied, or wanting. *Stigma* either simple or divided. *Fruit* in some instances pulpy, in others capsular, mostly with several cells, having one or many seeds in each, the partitions from the centre of each valve. *Coraculum* of the seed flat, surrounded by a fleshy albumen. *Stem* arboreous or shrubby; rarely herbaceous. *Leaves* alternate, simple, accompanied by stipulas.

Section 1. *Stamens definite in number, more or less combined in their lower part, or at the very base*. These are termed by Jussieu "doubtful Tiliaceæ." They consist of *Waltheria*, *Hermannia*, and *Mabernia*.

Seçt. 2. *Stamens distinct, mostly indefinite. Fruit of many cells. Genuine Tiliaceæ*.

*Antichorus*; *Corchorus*; *Heliocarpus*; *Triumfetta*; *Sparmannia*; *Sloanea*; *Apeiba* of Aublet, which is *Aubletia* of Schreber; *Muntingia*; *Flacourtia* of L'Heritier; *Oncoba* of Forskall, Lamarek Illustr. t. 471; *Stuartia*; *Greuvia*; and *Tilia*.

Seçt. 3. *Stamens distinct, indefinite. Fruit of one cell. Genera allied to Tiliaceæ*.

*Bixa*; *Lactia*; and *Banara* of Aublet and Schreber.

The author hints that this order might possibly, with propriety, receive a reinforcement of several polypetalous polyandrous genera, at present not well understood, and therefore annexed to other orders, among subjects that remain in doubt. He names *Soramia* of Aublet (see MAPPIA); *Calinea* of the same (see DOLIOCARPUS); *Cleyera* of Thunberg (see TERNSTROEMIA); *Vallea* of Linnæus; *Dicera* of Forster (see ELÆOCARPUS); *Caraiça*, *Maburea* (see BONNETIA), *Houmiria* (see MYRODENDRUM), *Vantanea* (see LEMNISCIA), all of Aublet; and *Trilix* of Linnæus. The reader will be able to form his own opinion on these matters, by turning to these articles in their proper places, many of the genera and their affinities having become better known since the publication of Jussieu's work.

The characters of his *Tiliaceæ* are hardly to be distinguished from those of his next order *Cisti*, the principal difference consisting in the straight *coraculum*, and more copious *albumen*, of the former.

TILLABARUM, in *Ancient Geography*, a town of Africa Propria, upon the route from Tacapæ to the Greater Leptis, between Thebelamum and Adauginagdum. Auton. Itin.

TILLÆA, in *Botany*, was dedicated by Micheli (followed by Linnæus) to the honour of his friend and fellow-labourer Michael Angelo Tili, who published a splendid and rich catalogue of the garden of Pisa, of which he had the care, in 1723. He was a member of the Royal Society of London, as well as of the Botanical Society of Florence, and corresponded with the chief botanists of his time, in England, Holland, and elsewhere. He travelled to Constantinople and Tunis.—Linn. Gen. 68. Schreb. 93. Willd. Sp. Pl. v. 1. 720. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 282. Sm. Fl. Brit. 201. Mich. Nov. Gen. 22. t. 20. Juss. 307. Lamarek Illustr. t. 90. Gært. t. 112.—Class and order, *Tetrandria Tetragynia*. Nat. Ord. *Succulentæ*, Linn. *Sempervivæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, in four deep, flat, ovate, large segments. *Cor.* Petals four, ovate, acute, flat, rather

rather smaller than the calyx. *Stam.* Filaments four, simple, shorter than the corolla; anthers small, roundish. *Pist.* Germens four; style simple; stigmas obtuse. *Peric.* Capsules four, oblong, pointed, reflexed, the length of the calyx, bursting longitudinally along the upper edge into two valves, with one cell. *Seeds* two, or many more, in each cell, ovate.

Obs. *T. muscosa* has the parts of fructification usually in threes, not fours. Gærtner discovered its flowers to be sometimes even five-cleft. He justly remarks, that such differences of number are in this natural order of little importance, and that *Tillæa* differs from *Crassula* in nothing but the want of nectariferous scales below the germens.

Ess. Ch. Calyx in three, four, or five segments. Petals as many. Nectaries none. Capsules three, four, or five, bursting inwards. Seeds several in each capsule.

1. *T. aquatica.* Water Swedish Tillæa. Linn. Sp. Pl. 186. Fl. Suec. 54. Willd. n. 1. Ehrh. Phytoph. n. 14. Schkuhr in Ust. Annal. fasc. 12. 6. t. 1.—Stem erect. Leaves linear, acute. Flowers nearly sessile.—Native of watery places in Lulea Lapland; as well as near Upsal, where water has stagnated, in lilly spots. *Linnæus.* A delicate, smooth, annual plant, two or three inches high, somewhat like *Montia fontana*, but much more slender, growing in dense tufts, simple or branched. *Leaves* opposite, stalked, narrow, acute, entire, a third of an inch long. *Flowers* either axillary and lateral, or in the forks of the stem, solitary, small, white, on very short stalks. The whole *herb* is succulent and pellucid.

2. *T. prostrata.* Prostrate German Tillæa. Schkuhr in Ust. Annal. fasc. 12. 6. Willd. n. 2. (*T. aquatica*; Schkuhr in Ust. Annal. fasc. 2. 21. t. 3.)—Stem prostrate. Leaves lanceolate. Flowers on short stalks.—Native of moist ground in Germany. Annual, differing from the foregoing in having many prostrate stems from one root, broader leaves, which are nearly cylindrical, and rather longer flower-stalks. *Seeds* eight in each capsule. Schkuhr.

3. *T. Vaillantii.* Stalked French Tillæa. Willd. n. 3. (*Sedum minimum annuum*, flore roseo tetrapetalo; Vaill. Paris. 182. t. 10. f. 2.)—Stem erect, much branched. Leaves ovate, clasping the stem, shorter than the flower-stalks.—Native of France. Observed by Vaillant, in the forest of Fontainebleau, where water has stagnated in winter, flowering from May to August. *Root* annual, of a few small tufted white fibres. *Stem* an inch or two high, repeatedly branched, scarcely forked, purplish. *Leaves* in pairs crossing each other, very thick, pointed, gibbous underneath, dark green, about two lines long. *Petals* four, rose-coloured, with a dark-coloured mid-rib. *Seeds* numerous, black, very minute.—The broader thicker leaves, and the much longer flower-stalks, render this very distinct, as Willdenow observes, from *T. aquatica*.

4. *T. peduncularis.* Long-stalked Brazil Tillæa.—Stem erect. Leaves lanceolate, acute. Flower-stalks often twice the length of the leaves. Capsules abrupt.—Gathered by Commerçon, in marshy spots that had been overflowed, at Monte Video. This grows in tufts, and has very much the habit of *T. aquatica*, for which possibly it may have been taken. There appears nevertheless much difference between them. The whole *herb*, in the present instance is red, and the *flowers* rose-coloured, growing on long stalks, which, though indeed variable, are never less than half the length of the leaves, and often twice their length. The shape of the leaves agrees with *aquatica*; but the capsules when expanded are more abrupt, and even inversely heart-shaped.

5. *T. muscosa.* Mossy Tillæa. Linn. Sp. Pl. 186. Willd. n. 8. Fl. Brit. n. 1. Engl. Bot. t. 116. Rose's

Elem. append. 448. t. 2. f. 2. (*T. muscosa annua perfoliata*, flore albo; Mich. Gen. 22. t. 20. *Sempervivum omnium minimum repens muscosum*, polygoni facie; Bocc. Mus. 36. t. 22. *Polygonum muscosum minimum*; Bocc. Sic. 56. t. 29.)

Æ. *Crassula muscosa*; Linn. Sp. Pl. 405. Am. Acad. v. 6. 86. Willd. Sp. Pl. v. 1. 1557. Thunb. Prodr. 54. See CRASSULA, n. 40. (*Ficoides africana annua minima muscosa*; Herm. Parad. 170.)

Stems procumbent, branched. Leaves obtuse. Flowers mostly three-cleft. Calyx and petals taper-pointed.—Native of sandy barren ground in the more temperate parts of Europe, flowering in summer. Abundant on sandy heaths near Norwich, Bury, Brandon, &c. The variety  $\beta$  is brought from Africa, from Lima, and even from New South Wales. We can find no difference in the dried specimens, except their being larger than our's, with somewhat of a glaucous hue, and the flowers partly stalked, more numerous, and all, as far as can be examined, five-cleft and pentandrous, just like Gærtner's plate of *T. muscosa*. The British specimens of the *muscosa* are from one to two inches high, strongly tinged with a blood-red, ascending, branched, with a fibrous annual root. *Leaves* elliptical, thick, obtuse, somewhat channelled above; clasping their stem at their base. *Flowers* mostly three-cleft, sessile; their petals white, with a taper red point, less than the calyx. *Seeds* only two in each capsule.

We scruple to retain in this genus four other species admitted by Willdenow. The first is *T. capensis*, Linn. Suppl. 129. Willd. n. 4; evidently, as Thunberg calls it, a *Crassula*, by its purple triangular nectaries, though, on account of its four-cleft flowers, made a *Tillæa* by Linnæus and Willdenow.

*T. perfoliata*, Linn. Suppl. 129. Willd. n. 5; *T. umbellata*, Willd. n. 6; and *T. decumbens*, Willd. n. 7; all referred to *Crassula* by Thunberg, have none of them fallen under our inspection; but as Willdenow avows having been guided by number, we have no scruple in removing them hence.

So also *Crassula moschata*, Forst. Magell. 16; gathered by that author, as well as by Commerçon, Menzies, Banks, and Solander, at Staten land, is most certainly a *Crassula*, because of its nectaries; though, on account of its four-cleft flowers, it has been taken by some great botanists for a *Tillæa*.

TILLAGE, in Agriculture, the practice of tilling or cultivating land, especially of the arable kind, or the means of bringing it into a state of preparation for the growth of different sorts of arable crops.

Of all the arts, says Vattel, tillage, or agriculture, is the most useful and necessary. It is the nursing-father of the state. It forms the surest resource and the most solid funds of riches and commerce, for people who enjoy a happy climate. This object, therefore, deserves the utmost attention of government: and it ought carefully to avoid every thing capable of discouraging the husbandman, or of diverting him from the labours of agriculture. Those taxes, those excessive and ill-proportioned impositions, the burthen of which falls almost entirely on the cultivators; and the vexations they suffer from the commissioners who levy them, take from the unhappy peasant the means of cultivating the earth, and depopulate the country. Spain is the most fertile and the worst cultivated country in Europe. The church possesseth too much land, and the undertakers of the royal magazines, who are authorized to purchase, at a low price, above what is necessary for the subsistence of himself and

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his family, so greatly discourage the husbandman, that he sows no more corn than is necessary for the support of his own household. Whence frequently arises the greatest scarcity in a country capable of feeding its neighbours.

Another abuse injurious to agriculture is, the contempt cast upon the husbandman. The inhabitants of cities, even the most servile artists, and the most lazy citizens, consider him that cultivates the earth with a disdainful eye; they humble and discourage him. They dare to despise a profession that feeds the human race; the natural employment of man. A little insignificant mechanic places far beneath him the beloved employment of the first consuls and dictators of Rome. China has wisely prevented this abuse; agriculture is there held in honour, and to preserve this happy manner of thinking, every year, on a solemn day, the emperor himself, followed by his whole court, sets his hand to the plough, and sows a small piece of land. Hence China is the best cultivated country in the world: it nourishes an innumerable multitude of people, that at first appears to the traveller too great for the space they possess. Besides, the cultivation of the soil is an obligation imposed by nature on mankind.

The most proper sorts of soils for the purposes of tillage-cultivation, are all those of the more dry and friable kinds, whether the depth of earth or mould, or what is often termed staple in them, be only slight or considerable; as under different circumstances these differences fit them for the production of different sorts of crops, the methods of cultivation in which are fully explained under their different proper heads.

In this view, all the various denominations of light soils, such, for instance, as gravels, sands, light chalks, and thin loamy lands, are well adapted, in most cases, to the purposes of tillage, from their being, in general, pretty well suited to the various sorts of grain, as well as to the raising of such green and root-crops as are necessary in the support and management of different kinds of live-stock. The more deep, loamy, chalky, and gravelly sorts of land, where they can be kept sufficiently dry, and in a proper state, during the winter season, may likewise, in many cases, be well employed in tillage-cultivation, and especially when they do not produce and afford an abundant and useful sort of herbage for the keeping of animals, or other uses. All the lands of the sward-kind, or in the state of grass, which are liable to be infested with the moss-plant, or to become over-run with a mossy covering, may, in common too, be managed under the tillage-system with much advantage, and better than in such a state of grass.

In some cases, lands may be suited to convertible tillage, or alternately that of grain and grass, with vast benefit to the farmer. It has been remarked on this sort of tillage by a late writer, that land may in this way often be turned to better account by ploughing and tilling it eight or ten years, and then laying it down to grass, in order to take up another part or portion, than by the common method, but especially where the land is subject to ant-hills; as the paring and burning destroys all such hills, and such land is sure to bring abundant crops of corn. And that there are very few situations that have dry land and soil fit for the plough, but what would bring more profit under tillage than by lying in the state of old grass; for when such good land as this is well laid down to grass, with plenty of good proper seeds, after a course of tillage, an acre of it will keep as much stock as four acres would which were produced in the natural way, and this is what makes its great value. Such tillage-land as this, it is said, is worth more money than the finest grass-land in the kingdom; as,

on the fine marshes so much boasted of, the earliest of the summer-stock comes to market at the very time when all sorts of vegetables are in plenty, such as peas, beans, and many others, and when meat consequently is sure to fall in price; and great numbers of grass-fed beasts, or cattle and sheep, come together. Besides, the very best grass-lands send only two sheep in the two early months of April and May from an acre; but the best tillage-land will send ten from an acre, and have them ready any time in the winter, when meat is the dearest. Thus, it is contended that ten acres of turnips will send one hundred sheep in the dearest time to the market, but that it will take fifty acres of the best land in grass, to send the same number to the market.

It is therefore concluded that, in this way, the tillage-farmer sends three hundred acres of corn to market, and as many fat sheep besides, acre for acre, as the best grazing-land; and that by still other improved methods of management, as that of the culture of flax for the use of the seed in fattening live-stock, and some others of a similar description, the tillage-farmer may derive greater profit than by the turnip practice, from the large quantity of winter-fattened animals, and the vast supply of dung or manure which is thus raised and provided.

Although the necessity of good tillage in the preparation of land for cropping be now pretty well understood by the practical farmer, and has been inculcated occasionally under different heads in the present work, it requires to be well explained in some of its processes. It has indeed been observed in the Agricultural Survey of the County of Hereford, after noticing that the Romans were convinced of the good effects of this sort of preparation, as Pliny has remarked the advantages of frequent ploughing and turning over the soil in Tuscany; and that, in this country, Evelyn suggested its power of so altering a soil from its former nature, as to render the hardest and hardest as well as most uncivil clay obsequious to the husbandman; that tillage also destroys weeds, and reduces the earth to small particles, rendering it sufficiently loose and porous to admit of the easy growth and extension of the roots and fibres of the grain to be cultivated in or upon it. And that the spade is well adapted to these purposes, because it moves the ground eight or ten inches deep, turns it upside down, and covers the weeds with a quantity of earth, under which they rot, and contribute towards its fertilization and improvement; and that this mode is founded on the just idea or notion of the Flemings, that a farm should resemble a garden as nearly as possible. But that as the spade method is much too tedious and laborious, as well as too expensive, to be practised on the larger scale of a farm, the plough is therefore substituted, as cheaper and more expeditious, but that, in general, it does not stir the earth so deeply, and often moves it in large bodies or masses, without sufficiently breaking it into pieces. In order to remedy this inconvenience, the celebrated Mr. Tull, it is said, recommended a plough of his own invention, which had four coulters instead of one, and thus divided the earth raised by the shares into several narrow slips; but the resistance occasioned by the additional coulters was found to require a greater strength in horses than the profits of the experiment and work would warrant. It was, however, afterwards ascertained by a distinguished foreigner, M. de Chateaubieux, that the breadth of the furrow should be proportioned to the stiffness of the soil or land; and that thus the resistance may be regulated on all kinds of land or soil. But the operation of repeated cross-ploughing, and the use of other tools, as now generally practised, aided as they are by full exposure

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exposure to frost, rain, &c. so effectually break down the hardest soils, that other measures are, it is thought, rendered less necessary. Since the above was written, however, many useful instruments have been formed, by which tillage-cultivation is not only rendered more effective, but more easy and expeditious, as may be seen by the descriptions which have been given of them under their different proper heads. See DRAG, SCARIFIER, SCUFFLER, SPIKE-ROLLER, &c.

M. Duhamel has since too observed in his "Elements of Agriculture," that some believe it is more advantageous to increase the fertility of land by frequent ploughing and other means than by manure; because, in general, only a certain quantity of manure can be procured; as twenty acres of land will, in common cases, scarcely produce as much manure as is necessary for five; whereas the particles of the earth may be divided and subdivided almost to infinity. The aids, therefore, which are derived from manure, must, it is supposed, be limited, whilst no bounds can be set to the benefits that may accrue from ploughing or breaking down and reducing the parts of the soil. This appears, the writer thinks, to be over-rating the advantages of breaking the soil down in other ways; but, it is certain, that when the particles of land or soil adhere so closely together as to impede the extension of the roots of plants, in search of the food and nourishment they require, the plants themselves cannot grow with proper vigour, or yield a proper produce. This is therefore to be corrected by frequent ploughings, &c. And that, lastly, repeated ploughings and other such means enable the land to receive and retain all the benefits to be derived from the floating vapours and dews of the atmosphere, which falling on hard ground, where it cannot readily penetrate, is quickly exhaled by the next day's sun and wind.

Notwithstanding these remarks, it may, however, be noticed, that no tillage or breaking down of the parts of the soil, though ever so complete and effectual, can wholly supply the place of manure, although it may greatly contribute, in different instances, to assist its fertility.

These are some of the more general and particular ways in which tillage becomes so essential and effectual in promoting the fertility and improvement of land; but there are a few others, the processes of which may be seen under their proper heads.

In the tillage-cultivation for most sorts of crops of the grain or corn kinds, as well as some others, it becomes essentially necessary that the soil should be reduced to a very considerable degree of fineness, or what is frequently termed *tilth* by writers on husbandry; as, where this is not the case, they can neither be so well provided with food or nourishment, nor be kept so perfectly and so sufficiently clean and free from weedy matters. There are other reasons too that require, at least, the more superficial parts of the soils to be in a fine condition of tillage for the receiving of such crops, which are those of the young tender roots of the new rising plants being thereby rendered more capable of fixing themselves perfectly in the mould which is produced, and of their drawing from it a more regular supply of food, in consequence of the more equal diffusion of moisture and other substances through it, which must necessarily take place. Besides, it is favourable in other ways, as by such tillage the seed-corn is not only more capable of being perfectly but equally covered, in consequence of which the vegetation and growth of the young plants of it are more equal and expeditious.

But besides the state and condition of the soil or land in regard to tilth, it should be in a suitable situation in respect

to dryness; as where there is too great a degree of moisture in it, the tillage can neither be performed in a proper manner, nor the seed-corn be put in without the danger of sustaining injury by becoming rotten before the vegetative process takes place, as not unfrequently happens to pea and other garden crops, when put into the soil during the moist winter months: and where, on the contrary, the land is in too dry a state, the tillage is improper to be effected, as causing too much exhalation, by which the seed-corn, when put in at such periods, may be much injured by the want of that moisture which is necessary for perfect vegetation. Under the last circumstance too, it may be more liable to be destroyed by worms, grubs, and other insects. On these accounts the arable farmer should, of course, be equally attentive to the tillage preparation of the soil, and the condition in which it may be cropped to the greatest advantage, and with the greatest chance of success.

The writer of the "Elements of Agricultural Chemistry" states, that in all cases of tillage, the seeds should be put in so as to be fully exposed to the influence of the air. And that one cause of the unproductiveness of cold clayey adhesive soils is, that the seed becomes coated with matter impermeable to air. All immediate tillage, for putting in crops, should consequently be performed as much as possible in suitably dry weather on such sorts of land.

In sandy soils, he says, the earth is always sufficiently penetrable by the atmosphere; but in clayey soils there can scarcely be too great a mechanical division of the parts in the process of tillage.

In general, the best and most effectual method of breaking down and bringing land into the state of proper tillage, is by the use of the plough and different other implements of the harrow kind, such as those which have been noticed above, suited to the intention of the cultivator, and the peculiar nature of the land or soil. The tillage with the plough should constantly be performed according to the nature of the soil, and that of the crop which is to be sown or set, and the operations which are afterwards to be executed upon it. But to whatever depth this may be proper to be done, it is of much consequence to have it performed in an exact and effectual manner; as on this not unfrequently depends the difference between a good and bad crop, as well as that between the animals employed in the labour moving with ease and with difficulty. The repetitions in the tillage of this sort must be constantly regulated by the quality and circumstances of the land and the designs of the farmer, as some sorts and cases of land require much more tillage than others. This point is most decidedly evinced in the Agricultural Survey of the County of Gloucester. On the Cotswolds, it is the practice, the writer remarks, to sow their crops on one ploughing, experience having proved that frequent ploughings or tillage on these light soils, weaken the staple of the land, and are productive of injury.

On the strong lands or soils of the county of Essex, the most intelligent and successful practical farmers, it is said, are those who are the most careful in the repetition of tillage of the plough kind, to which they constantly attribute great powers and effects. The strong heavy lands have it eight or more times in many cases, even for barley or oats; and on those which are less so, the general system of tillage is mostly four or five times for the different fallow crops. In this last intention, it is not unusual to commence the first tillage ploughing towards November, continuing it nearly or quite to the end of March, after barley sowing; and if at the first period of such tillage the ridges be laid a little round, so as to be water-shot, and after that well water-furrowed, the tillage is greatly promoted. The land is mostly

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first broken up into ridges of eight or twelve nine-inch furrows; then crossed, and the tillage given in different ways very often during the summer season, carefully turning up and exposing every time a different surface, as much as possible, to the sun and air: before harvest it is got up on four-furrow ridges, when, after that season is over, it has again immediately another tillage ploughing; and if the weather be suitable, it is done twice, leaving it upon the ridge for the ensuing winter: the later the last tillage furrow is given the better, in this district, for preventing the black grass-weed getting up; after which the whole is well water-furrowed for taking off any water that may be upon it: by these means the land is much earlier got upon in the spring season than could otherwise be done, and in consequence, when the tillage for barley is performed, such stiff tenacious lands break down into the finest tilth it is almost possible to conceive.

In executing the work of tillage on ridges for wheat, or any other sort of crop, great attention is here bestowed on turning the furrows well, drawing them straight, making them alike in size, and lapping them with such regularity on to each other, that the harrow tools cannot fail to lay hold of them all with facility; the shutting-up furrow more especially is drawn with perfect straightness, exactly turned, swept out with cleanness, and at the same time the space between the ridges not left in too wide a state.

But notwithstanding this great and frequent tillage, in some places they do not venture in the seed on the autumnal furrow, but give a spring plough tillage, though perhaps some other tool of the tillage kind might answer better in many cases, and be far more expeditious.

The most proper and suitable depths of tillage for different sorts of soils, have probably not yet been well ascertained; but such as have a good strong staple, require much more deep tillage than those of the light kind. Whether flat-work tillage, as practised in Norfolk, or that of feather-edged, as employed in Essex, has the advantage, is not properly decided, but probably each may have a superiority on different sorts of land: the great point of importance is that of allowing the covering of the seed well.

The plan of tillage given below has been advised in the Corrected Agricultural Survey of the County of Salop, for the lighter sorts of friable lands, on a farm of four hundred acres: first, the wheat stubble is to be harrowed by drawing the harrows one way, which lays the stubble; and by returning back along the same stroke, they draw the greater part of that which was gathered by the harrows; and a proper person following them with a fork, unloads them, and lays the stubble in heaps, to be disposed of as directed below.

This stubble ground has the tillage of ploughing from the middle of November to the end of the following month; about the beginning of March it has that of cross-ploughing given it, and when dry, well harrowed; and when the weather is suitable, much of the couch-grass is got out of it and burnt; but when not so, it is, in this way, checked in its growth during the seed-time, and the business is more easily performed; which is to be done in the month of May and the two succeeding ones, in which the fallow lands have the tillage of three ploughings and sufficient harrowings to prepare them for turnips, for which eight cubic yards of reduced dung, or seventy-two bushels of clod-lime, are laid upon the acre; which are ploughed in at the last tillage-furrow, though sooner, it is thought, would be better, if the dung be reduced enough by that time, or the land be so clean as not to require much harrowing. Turnip-feed, one pound to the acre, is then sown from the 7th of June to the

14th of the following month, the plant being twice hoed; the average produce is from 2*l.* to 2*l.* 15*s.*

As the same land becomes cleared of its crop of turnips, it has the tillage of ploughing and harrowing, preparatively for a crop of barley: and being again tilled, by being ploughed up in butts or lands five yards in width, from the latter end of March to the latter end of the following month, is sowed with three and a half statute bushels of barley, fourteen pounds of common red clover-feed, and one peck of fine rye-grass-feed to each acre: the average produce is about forty bushels, of the statute kind, of barley to the acre.

The young clover which is not eaten between December and May, in the part which is mowed, on an average produces about two waggon-loads, or a ton and a half to the acre. In the succeeding month of October, it is ploughed in the tillage of nine-inch furrows and six inches deep, and sowed with two and a half bushels of wheat: the produce about seventeen bushels the acre.

The turnip-crop is generally disposed of somewhat in this manner: first, by drawing home those under the hedges, at the beginning of November, and some of the largest over the rest of the field, taking all up where the horses and carts are to pass. When the tops and small roots are cut off, they carry them home, and place them in heaps of about twelve cart-loads each, in the form of the cone of a wheat-rick, covering them a foot thick with straw and thatch. These serve as a resource in time of frost and snow, for the beasts that are stall-fed, of which there are generally twenty yearly; and a man and boy, with one horse and cart, supply them; leaving ultimately in the fields as many turnips to be eaten off upon the land by sheep, as to ensure fertility enough for the crops of barley, &c. as the barley, being too rank, commonly spoils the young clover growing with it. Another advantage in this plan of tillage, which is obtained by stall-feeding with turnips, is the making a large quantity of straw into manure at home: which is the best use that can be made of it, as straw-food is not an improver of cattle-stock.

This method of tillage or cultivation for dry lands, is recommended to those who have been in the practice or custom of long tillages, and without the use of general turniping, to be continued for so long as two courses of tillage, that is, eight years; by which time their land will be clean, and more fit for what is conceived to be a more beneficial mode of husbandry, and which mode is now, it is said, pursued; namely, first turnips, managed and manured for as above; second, barley; third, pease, in rows one foot asunder, hand-hoed and weeded; fourth, barley, with ten pounds of common clover, four pounds of white Dutch clover-feed, two pounds of trefoil-feed, and one peck of fine rye-grass-feed, eight cubic yards of rotten dung, or seventy-two bushels of stone-lime laid upon the young clover in November; fifth year, mow or graze the land; the sixth, graze until October; and the seventh, give a plough tillage, and sow with wheat as before; the land mucked for turnips, and lime or compost of lime, and earth or mud, &c. laid on the young clover in the autumn. This is believed to be a more profitable course of tillage, after land has been got into order, than that which was previously practised, affording a greater change, and thereby obviating the failure both of turnips and clover, and occasioning more grass-land, which for many years has there exceeded the tillage in point of profit.

As an improvement of wheat-lands, or mixed soils upon clay, the mode of tillage directed below is advised to be practised.

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The turf or other land being well ploughed or tilled, and laid dry before Christmas, in the following month of April sow the land with four and a half statute bushels of oats, plough and lay it dry in the autumn, and in the month of May and the two following ones, give it three good tillage ploughings and harrowings, with some rollings, &c. so as to reduce it well; being thus drawn up and laid dry, it may continue in that state to the middle of September; though made both fine and clean, it sometimes gets an adhesive and binding quality, and consequently works lumpy, and therefore has the texture and quality which the farmer, by mistake, is afraid of losing by making his land clean. It is, however, it is said, in the three above months, when the sun is powerful, that land is to be cleaned by tillage: a ploughing in August is seldom of much worth.

If manured with lime, lay eighty bushels upon the acre; if with dung, ten cubical yards to each acre, either ploughed under at the July tillage ploughing, or before. From the 20th of September to the 10th of the succeeding month, sow wheat nine statute pecks to the acre, after having soaked the same not more than eight hours in mild brine, and dried it with lime, to prevent the smut. The next autumn plough the corn stubble, and at the end of March plant beans or peas in rows one foot asunder, hand-hoe and weed them. Plough in the autumn, and sow oats in the spring, and lay down with ten pounds of red clover-feed, four pounds of white Dutch clover-feed, and one peck of rye-grass-feed to each acre. Manure the land in feeds in the autumn, and let it lie in sward two or three years, as it may be required. At the next breaking up, plant the land with beans, hand-hoe and weed them; the ensuing autumn sow it with wheat, then with beans in rows, hand-hoe and weed that crop; then put in oats and lay down with feeds, as before. In lieu of one of the hoeing crops, if the land be not too wet, potatoes may be planted, which would be found very profitable to the wheat-land farmer; being very useful food for feeding or milking cows in the winter season. The farmer should fallow for the first crop in one tillage, and hoe the next, and so proceed alternately; the summer sun to wheat-lands being certainly useful, and also the manuring with dung or lime in an alternate manner. Where marle is to be procured at convenient distances, nothing turns to more profit; upon open soils, with either clay or dry bottoms, marle laid upon the sward in the autumn, and to lie one year, is commonly the best practice, especially if the marle be not perfectly good. Lime is sure to pay well the next tillage course.

On this mode of tillage it is, however, remarked, that good farmers, on light soils, will entertain the plan here prescribed with some caution, and that their apprehensions of a crop of couch will often outweigh their hopes of a crop of clover. That peas are precarious; one week's hot weather whilst in blow is often fatal to the crop.

It is added too, on the authority of Mr. Harries, after noticing the insufficiency of some fallow tillage lands, that there are many active farmers who begin the tillage on their fallows in January, and by repeated ploughings, harrowings, and rollings, bring them into very good order for wheat. Others graze the second year's clover until about the middle of the summer, and sometimes mow it at that time: if the soil be dry and the summer favourable, they bring it into very good tillage order by feed-time. It would, however, it is thought, be better tillage husbandry to raise a crop of turnips on such lands, after wheat or barley. If this was done, at least in every course of tillage, a good crop of wheat would be grown upon clover lays, upon one tillage ploughing, at a light expence. It is frequently his custom to break

up his clover lays of the first or second year, if they are tolerably clean, upon one ploughing, putting upon the plough a cutting tool or instrument, which is there termed a *say* or *flay*, that cuts or pares off the surface turf, and lays it in the bottom of the furrow. Lately, a clover lay was worked with this instrument upon the plough, and after the feed was harrowed in, scarcely any of the surface turfy matter came upon the ploughed surface, the field looking as well, and appearing as clean, as though it had been sown upon fallow tillage.

Some, however, on hollow lands, do not approve of this skimming or paring tillage; as slicing the surface of such soils they consider much worse than turning it over in the ordinary manner, and letting the surface vegetable matters be laid into the furrows in a sort of diagonal position, though some of them should even appear out in the seams. The notion is notwithstanding probably erroneous, as such surface produce is always, in some way or other, to be rotted and got rid of, as in every mode of tillage it is ploughed in or under, and the main point is how to get the most speedily and completely quit of it, and to render it the most useful to the crop which is to be put in. These are certainly the best and most fully accomplished by taking it wholly off by such a cutting apparatus, and placing it at the bottoms of the furrows, which must also lessen the hollowness of the land at the same time.

In the breaking-up tillage of old grass-lands, it must be executed in a manner suitable to the nature, state, and quality of the soil, whatever that may be, reducing and breaking the turfy sward well and carefully down, and clearing it effectually from insects and vermin of all sorts by proper crops, such as those of the pea, bean, teasel, and other similar kinds, before the introduction of those of the grain sort. In this way, the lands will not only be the best wrought into a proper state of tillage, but the corn-crops the most effectually secured from the danger of worms, grubs, and other noxious vermin.

It has been remarked by the writer of the Corrected Agricultural Survey of the County of Norfolk, that for the last four or five-and-thirty years that he has examined West Norfolk with the eye of a farmer, the change in the tillage system, which has taken place in that vast arable district, has not been great. At the early part of that period, the tillage course was, it is said, first, turnips; second, barley; third, grasses for two, or, in a few cases, three years; fourth, white corn: on the better soils, wheat; on others rye, &c. The only material change that has occurred, has been, it is thought, in the grasses: the variation, which, it is believed, first took place from forty to fifty years ago, was shortening the duration from three years to two; in both cases giving what may be called a sort of bastard fallow the last year, by means of a half-ploughing, soon after the middle of the summer. Above thirty years ago, the writer, it is said, contended, both in print and in conversation, against it, but was held cheap for entertaining any doubts of the propriety of the practice. He has lived, however, it is observed, to see this change also in a great measure take place amongst the best farmers, who now give only one ploughing for the winter corn, whether wheat or tares; or in the spring for peas. That it is an improvement cannot be questioned, it is thought. The argument for it, founded on the invention of the drill-roller, and on the introduction of the drill-plough, is good, it is said, but not singular, as the practice of dibbling is likewise far more adapted to a whole than to a broken furrow; and for broad-cast common sowing, if we are able to cover the seed by harrowing on stiff soils, once ploughed, assuredly the same practice might be better followed on sand. The

other reason for the former system, spear-grass getting a head in a layer, is quite inadmissible, it is thought; as he must entirely agree with Mr. Overman, a large tillage cultivator in that district, that no weeds, the seeds of which are not carried by the wind, will be found in a layer, if they were not left there.

It is contended likewise, that the variations which have taken place in the tillage crops put in upon layers, are neither great, nor are they peculiar to the above county; the principal one is that of taking pease on the flag, and then the wheat, and others, an admirable system, which, it is said, has long been practised by good farmers in Suffolk, and, it is believed, still earlier in Kent. That Mr. Purdis's mode of substituting tares holds on the same principle. Considering the very great use and value of white pea-straw, well got, as sheep food, which is no where better understood than in Kent, it is thought there is no tillage husbandry better adapted to a sheep-farm, than this of pease or tares preceding the wheat crop.

But it is thought that a very great and important change has taken place in the application of tillage crops to sheep instead of bullocks and cows. Formerly the farmers consumed much of their straw by cattle; now the best of them have it all trod into manure. Sheep are the main grazing flock, and no more cattle kept than for treading, not eating straw while feeding on oil-cake and other such food. This is, it is contended, a very important change, which has had considerable effect, and which has depended not a little on the introduction of South Down sheep. Yet still, it is conceived, that the grand object in the whole tillage system, is the singular steadiness with which the farmers of West Norfolk have adhered to the well-grounded antipathy to the taking of two crops of white corn in succession: this is talked of elsewhere, it is said, but no where so steadily adhered to as in this district. It is this maxim, it is said, which has preserved the effect of their marle on thin-skinned lands of the wheat kind in such a manner, that the district continues highly productive, under an almost regularly increasing rent for more than sixty years, or three leases of twenty-one years each; and by means of which great tracts have been marled a second, and even a third time with much advantage. This tillage system, it is supposed, has been that to which the title of Norfolk husbandry has been long, and is now peculiarly appropriated; and by no means that of the management of the very rich district of East Norfolk, where the soil is naturally among the finest in the kingdom, and consequently where the merit of the farmer must be of an inferior stamp; barley there, it is said, very generally follows wheat; an incorrect tillage husbandry, deserving no praise, but condemnation. The celebrity of the county in general was not heard of, it is said, until the vast improvements of heaths, wastes, sheep-walks, and warrens, by enclosure, and marling took place in consequence of the exertions of Mr. Allen, of Lyng-House, lord Townshend, and Mr. Morley, who were in the first thirty years of the preceding century. They were happily, it is said, imitated by many others; an excellent system of tillage management introduced, and such improvements wrought, that estates and lands which were heretofore too insignificant to be known, became objects of public attention in the capital. The fame of Norfolk, it is remarked, gradually expanded, and the husbandry of the county was celebrated before East Norfolk was heard of beyond the conversation of Norwich and Yarmouth. It is, however, asserted, that without a continuance of cautious tillage management and persevering exertions, West Norfolk would even again become the residence of poverty and rabbits. But let the meadows be improved;

irrigation be practised wherever it is applicable; the remaining wastes cultivated; and this district will, it is maintained, become a garden. Such are the utility and importance of good tillage and other systems in the cultivation and improvement of land.

In concluding, it may be stated from the Corrected Agricultural Report of the County of Hereford, that the importance of the tillage farmer cannot be disputed; and yet that perhaps no branch of the art of husbandry is clogged with so many obstacles and impediments to its improvement and success. The advantages of the grazing system over that of tillage-cultivation, hold out a great inducement to the farmer to convert his tillage land into pasture, the immediate effect of which must be felt in the reduced quantity and increased price of grain of every description. And unfortunately, this is not the only obstacle or hindrance to the tillage farmer; the tax on horses used in agriculture operates also against the proper tillage culture of the ground. It was probably supposed, it is said, by the framers of this duty, that the number of horses would thus be diminished, and that of oxen increased; but it should be recollected that oxen, valuable as they sometimes are as *auxiliaries*, can never be made the *substitute* of horses for tillage; their constitution and habits will not admit of it; and the shoe with which they are occasionally furnished, affords but an imperfect protection to the foot on hard lands or stony roads. See TEAM.

No check, but every encouragement, should certainly be given to tillage, or the means of raising and providing the bread-corn for the increasing population of the country. See SUPPLY and Consumption.

TILLAGE Farm, that sort of farm which is, for the most part, cultivated under the arable or tillage system, or that by means of the plough. See FARM.

TILLANDSIA, in *Botany*, was so named by Linnæus, in memory of an early Swedish botanist, Dr. Elias Tillands, professor of physic at Abo, who died in 1692, aged 52, after having published in 1683 an octavo alphabetical catalogue, in Latin and Swedish, of the wild, as well as cultivated, plants of the neighbourhood of his residence. This little volume was accompanied, or soon followed, by another, consisting of rude, but often expressive, wooden cuts, of 158 plants, mentioned in the foregoing catalogue. It is a defect in these cuts that they are not always original; an instance of which occurred to the writer of the present article, while preparing a critical dissertation on some British species of *Hieracium*, see Tr. of Linn. Soc. v. 9. 232. The *Pilosella*, t. 14. of Tillands proving a copy of Tabernæmontanus, rendered his work of no authority in an important point; though such a defect was not previously known, even to his learned countryman the late Mr. Dryander; and the book sunk immediately in his estimation, except as a rarity.—A curious reason for the name of *Tillandsia*, as applied to the genus of which we are about to speak, is given by Linnæus himself, in his *Prælectiones in Ordines Naturales Plantarum*, published by Giseke, p. 291. "*Tillandsia* cannot bear water, and therefore I have given this name to the genus, from a professor at Abo, who in his youth having an unpropitious passage from Stockholm to that place, no sooner set his foot on shore, than he vowed never again to venture himself upon the sea. He changed his original name to Tillands, which means *on*, or *by*, *land*; and when he had subsequently occasion to return to Sweden, he preferred a circuitous journey of 200 Swedish miles through Lapland, to avoid going eight miles by sea." This circumstance is also alluded to in the *Tour in Lapland*, published from the journal of Linnæus in 1811, v. 1. 43. One of the most invidious

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ensors of this great botanist has declared that he would "excuse a thousand of his faults for the sake of the above name alone."—Linn. Gen. 158. Schreb. 212. Willd. Sp. Pl. v. 2. 11. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 202. Pursh 217. Juss. 50. Lamarck Dict. v. 1. 616. v. 7. 666. Illustr. t. 224. (Caraguata; Plum. Gen. 10. t. 33. Renalmia; *ibid.* 37. t. 38.)—Class and order, *Hexandria Monogynia*. Nat. Ord. *Coronaria*, Linn. *Bromelia*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, oblong, erect, permanent, in three oblong-lanceolate, pointed segments. *Cor.* of one petal, tubular; tube long, inflated; limb small, erect, in three obtuse segments. *Stam.* Filaments six, linear, inserted into the tube of the corolla, and of the same length; anthers acute, incumbent, in the throat of the tube. *Pist.* Germen superior, oblong, tapering at each end; style thread-shaped, the length of the stamens; stigma three-cleft, obtuse. *Peric.* Capsule elongated, bluntly triangular, pointed, scarcely separated into more than one cell, of three valves. *Seeds* several, cylindrical, each supported on a long stalk of aggregate fibres, becoming a feathery wing.

Ess. Ch. Calyx inferior, three-cleft, permanent. Corolla tubular, three-cleft. Capsule with three valves. Seeds on a feathery wing.

1. *T. utriculata*. Bottle Tillandsia. Linn. Sp. Pl. 409. Willd. n. 1. Ait. n. 1. (*Viscum caryophylloides maximum*, flore tripetalo pallidè luteo, femine filamentoso; Sloane Jam. v. 1. 188.)—Leaves linear, channelled, recurved; dilated and inflated at the base. Stem closely panicle.—Found on the branches of large trees in Jamaica, where it is known by the name of Wild Pine. Sloane observes that the long, tough, smooth fibres of the *root*, which is perennial, do not insinuate themselves into the bark or wood, to draw nourishment from thence, but merely grasp the branch, fixing themselves firmly to the bark for support. *Stem* solitary, round, smooth, leafy, three or four feet high. *Leaves* numerous, often a yard long, channelled, entire, tapering to a very slender point, recurved, striated; paler beneath, and clothed with extremely minute chaffy scales like powder; the radicle ones greatly enlarged and tumid at the base, where they form a sort of oval hollow vessel, which holds a quantity of water, collected during the wet season, from the rain trickling down the channels of the leaves. In this it is said that small aquatic animals sometimes take refuge, while birds, and even men, are reported to have hence derived a welcome supply of drink. The water seems destined to support the plant during drought, when it could otherwise obtain nothing by its roots; but this slender stock is enough to preserve life, and indeed a considerable degree of luxuriance. The *flowers* are of a pale greenish-yellow, with purple *anthers*, and compose a close branched panicle. The long branching down which accompanies each *seed*, and is inserted into its base, carries it to a distance, and readily clings to the rough barks of trees, where the *seed* speedily vegetates. When the *stem* is wounded, a clear white mucilaginous gum exudes. *Sloane*.

2. *T. ferrata*. Serrated Tillandsia. Linn. Sp. Pl. 409. Willd. n. 2. Ait. n. 2. (Caraguata clavata et spicata, foliis ferratis; Plum. Ic. 63. t. 75. f. 1.)—Leaves flat, smooth, with strong spinous ferratures; entire towards the base. Spike compound. Bractees with spinous teeth.—Native of Jamaica. Brought to Kew, with the foregoing, by captain Bligh, in 1793. This is a large stout perennial plant, with the aspect of an *Aloe*, but not so succulent. The *leaves* are two or three feet long, and two inches broad, their upper part especially bordered with hooked spines;

their under side curiously and minutely dotted between the numerous fine ribs. *Stem* and *compound spike* beset with broad, ovate, pointed *bractees*, whose spines are more direct and tooth-like; the under side ribbed and dotted in the manner of the leaves.

3. *T. lingulata*. Tongue-leaved Tillandsia. Linn. Sp. Pl. 409. Willd. n. 3. Ait. n. 3. Jacq. Amer. 92. t. 62. (Caraguata latifolia clavata; Plum. Ic. 63. t. 74. *Viscum caryophylloides maximum*, capitulis in summitate conglomeratis; Sloane Jam. v. 1. 189. t. 120.)—Leaves flat, somewhat tongue-shaped, smooth, entire, as well as the crowded bractees.—Native of old trees in the vast forests of Martinico, as well as of Jamaica, where it is said to collect water, like the first species. In size it agrees with the second, but the entire *leaves*, and the close leafy head or spike of *flowers*, abundantly distinguish that before us. Jacquin says the *flowers* are yellow, inodorous, three inches long.

4. *T. tenuifolia*. Slender-leaved Tillandsia. Linn. Sp. Pl. 410. Willd. n. 4. Swartz Ind. Occ. v. 1. 591. (Renalmia spicâ multiplici, angustifolia, flore cæruleo; Plum. Ic. 234. t. 238. f. 2. *Viscum caryophylloides minus*, foliorum imis viridibus apicibus subrubicundis, flore tripetalo purpureo, femine filamentoso; Sloane Jam. v. 1. 190. t. 122. f. 1.)—Leaves linear-thread-shaped, channelled, erect, taper-pointed. Spikes alternate, imbricated. Flowers two-ranked.—Parasitical, like all the foregoing, on the branches of trees in the West Indies. The *stem* is a foot high, simple, entirely concealed by the broad sheaths of the *leaves* which clothe it. The radical *leaves* are very numerous, above a span long, very slender, resembling those of some long-leaved kinds of *Pinus*, but more tapering and channelled; moderately dilated, sheathing, downy and rusty, at the base. Those of the stem are much shorter, and almost setaceous, though their base is still broader. *Spikes* three or four, alternate, sessile, imperfectly two-ranked, lanceolate, an inch long, proceeding from broad sheathing *bractees*. *Flowers* imbricated in two rows, blue. Linnæus quotes by mistake a synonym of Jacquin, belonging to the following.

5. *T. flexuosa*. Zigzag Tillandsia. Swartz Ind. Occ. 590. Willd. n. 5. Ait. n. 4. (*T. tenuifolia*; Jacq. Amer. 92. t. 63.)—Leaves linear-lanceolate, channelled, recurved. Spikes lax, zigzag. Flowers two-ranked, distant.—On trees near the sea in Jamaica, as well as near Carthage in South America. Extremely unlike the last. The *leaves* are very broad and concave in their lower part, convoluted about the base of the stem, green, elegantly marked with broad, whitish, minutely scaly, transverse stripes; their points recurved in all directions. *Stem* twice as tall as the leaves, being two or three feet high, mostly subdivided in the upper part, invested with close red sheaths, and terminating in two or three long, lax, zigzag *spikes*, with triangular stalks. *Flowers* about an inch or more across. *Calyx* coloured, near an inch long. *Corolla* still longer, with reflexed segments, at first blue, then red, as we presume from Dr. Swartz's description and the analogy of *T. striata* hereafter described. *Capsule* long, of three cells, the valves black and shining on the inside.

6. *T. setacea*. Setaceous Tillandsia. Swartz Ind. Occ. 593. Willd. n. 6.—Leaves linear-thread-shaped, recurved, nearly smooth. Spike simple, with two-ranked imbricated sheaths.—Found on trees in Jamaica. *Stem* a foot or more in height, round, nearly upright, clothed with alternate, broad, bristle-pointed sheaths. Radical *leaves* nearly equal in length to the stem, numerous, sheathing at the base, greyish, rigid, somewhat mealy as it were, with very minute scales.

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scales. *Spike* terminal, solitary, ovato-lanceolate. *Flowers* alternate. Most like *T. tenuifolia*, n. 4, but differing in its recurved *leaves*, and simple solitary *spike*.

7. *T. paniculata*. Panicked Tillandsia. Linn. Sp. Pl. 410. Willd. n. 7. Lamarek v. 1. n. 6. (Renalmia ramossissima, floribus variegatis et circinatis; Plum. Ic. 233. t. 237.)—Radical leaves very short, lanceolate. Stem panicked, twice compound. Spikes erect. Segments of the corolla linear, spiral.—Native of South America. We know nothing of this species but from Plumier, whose figure represents numerous, crowded, erect, concave radical leaves, and a stem alternately branched from the very bottom, with two-ranked reclining branches, laden with ascending spikes. A copy, in our possession, of his original drawing shews the flowers to be four inches long.—We have no good authority for Browne's synonym, cited by authors, nor does it, if correct, throw any light upon this very obscure species. Lamarek informs us, from Plumier's manuscripts, that the stem is sometimes taller than a man; that the calyx is spotted with green and purple; corolla of a violet blue, dotted with purple, its long narrow segments becoming spiral as they expand. This is the circumstance to which Plumier's definition alludes. His greatly reduced plate is not sufficiently exact to explain it, and Linnæus inaccurately copied foliis for floribus, in which Willdenow, of course, follows him without the least enquiry.

8. *T. fasciculata*. Fasciculated Tillandsia. Swartz Ind. Occ. 586. Willd. n. 8.—“Leaves lanceolate-awl-shaped, erect, straight. Spikes lateral, two-ranked, imbricated.”—Found on trees in Jamaica, in thickets near the sea-shore. Stem one or two feet high, leafy, simple. Radical leaves broad, concave, and sheathing, at the base; lanceolate and tapering upward, very slightly recurved; downy externally; those of the stem shorter, somewhat imbricated, ovate, with long awl-shaped points. Spikes alternate, lateral and terminal, two-edged, an inch broad, with imbricated ovate bractæas, membranous at the margin. Flowers solitary. Capsule an inch long. Swartz. Lamarek's *T. clavata*, cited by Willdenow with a mark of doubt, belongs to *T. monostachya*, n. 11, as evidently appears from Plumier's synonym, the figure belonging to which these writers overlooked.

9. *T. nutans*. Nodding Tillandsia. Swartz Ind. Occ. 588. Willd. n. 9. Ait. n. 5.—“Leaves ovato-lanceolate, membranous. Stem nearly naked. Spikes subdivided, drooping. Flowers separate, ovate.”—Native of branches of trees on hills in Jamaica. Plant from one to two feet high. Leaves all radical, tumid at the base, striated lengthwise, smooth, much shorter than the stem, which is round, clothed with membranous striated sheathing scales. Spikes alternate, rather distant, drooping, with angular stalks. Flowers distinct, near each other, but not imbricated. Corolla white. Capsule roundish-ovate. Swartz.

10. *T. polytachya*. Many-spiked Tillandsia. Linn. Sp. Pl. 410. Willd. n. 10. (Renalmia spica multiplici, flore albo; Plum. Gen. 37; also as Linnæus supposed, R. alia, spica multiplici, angustifolia; ibid. 37. Viscum caryophylloides angustifolium, floribus cæruleis; Catcb. Carol. v. 2. 89. t. 89?)—“Stalk bearing imbricated lateral spikes.”—Native of South America. We can make out nothing further of this species, nor how Linnæus came to a knowledge of it, there being no specimen in his herbarium. Swartz however appears to be acquainted with the plant; see his remarks under n. 13. and 14.

11. *T. monostachya*. Single-spiked Tillandsia. Linn. Sp. Pl. 410. Willd. n. 11. (*T. clavata*; Lamarek Dict. v. 1. n. 4. Renalmia clavata, floribus niveis; Plum. Ic.

233. t. 238. f. 1. R. non ramosa squamata, et floribus niveis; Plum. Gen. 37.)—Leaves radical, linear, channelled, recurved; broad and sheathing at the base. Stem simple, clothed with imbricated scales. Spike simple. Bractæas ovate, concave.—Native of the West Indies. Plumier gathered it on old trees in Hispaniola. The numerous radical leaves spread widely in every direction, being about a foot long, and two inches broad, so much recurved that their points touch the branch on which the plant is fixed. Stem from fifteen to eighteen inches high, erect, round, firm, quite simple, as well as its spike. Bractæas white, streaked or dotted with red. Corolla snow-white; its limb in three deep ovate segments.

12. *T. pruinosa*. Frosted Broad-leaved Tillandsia. Swartz Ind. Occ. 594. Willd. n. 12.—Leaves lanceolate, taper-pointed, recurved, clothed with shaggy scales. Spike simple, with imbricated, pointless, downy bractæas.—Found on the arms and stems of aged trees in Jamaica, as well as in Brasil. Stem a foot or more in height, simple, leafy. Radical leaves a foot long, spreading variously, near an inch broad at the bottom, but soon contracted into a long taper point, flat, densely clothed all over with shaggy, torn, peltate, shining scales, the marginal ones flat, imbricated, and much dilated; stem-leaves much shorter and narrower. Spike terminal, solitary, simple, an inch long, ovate. Bractæas ovate, bluntish, concave. Corolla blue, longer than the bractæas. Capsule oblong, triangular, smooth.

13. *T. canescens*. Hoary Tillandsia. Swartz Ind. Occ. 595. Willd. n. 13.—“Radical leaves linear, erect, hoary, as tall as the stem. Spikes about three, terminal.”—Native of Jamaica, on trees near the sea-shore. Perennial, about a foot high, with short, simple, curling, fibrous roots. Stem simple, leafy. Radical leaves imbricated, linear, rigid, whitish or hoary; with very broad, ovate, concave, tumid, membranous, sheathing bases; stem-leaves tapering, acute, with more lax sheaths. Spikes usually three, crowded at the top of the stem, sessile, ovate, acute, flattish. Bractæas two-ranked, imbricated, ovato-lanceolate, smooth. Corolla red, with long segments. Nearly related to *T. polytachya*, but that species is taller, with recurved, zigzag, smooth leaves, and numerous, scattered, lanceolate spikes. Swartz.

14. *T. angustifolia*. Narrow and long-leaved Tillandsia. Swartz Ind. Occ. 596. Willd. n. 14.—“Leaves linear-lanceolate, nearly erect, smooth, taller than the stem. Spikes somewhat clustered.”—Found on the trunks and branches of trees, in Jamaica and Hispaniola. Perennial. Stem two feet high, nearly upright, simple, leafy. Leaves all imbricated, broad and sheathing at the base, lanceolate, narrow towards the end, straight, striated; the sheaths of the radical ones broadest, and rather inflated. Spikes numerous, scattered, somewhat clustered, alternate, separated by leafy sheaths, imperfectly imbricated, compressed, lanceolate, many-flowered, an inch and half long. Flowers two-ranked. Bractæas imbricated, equitant, ovate, pointed, keeled, striated, smooth. Capsules elongated, pointed, triangular, smooth, extending beyond the bractæas. This likewise is cautiously to be distinguished from *T. polytachya*, by having more upright leaves, longer than the stem, and the spikes separated by leafy sheaths. Swartz. Nothing is mentioned respecting the colour of the flowers.

15. *T. striata*. Frosted Stiff-leaved Tillandsia. Gawler in Curt. Mag. t. 1529. Ait. Epit. 375. Banks Ic. Ined.—Leaves chiefly radical, linear-lanceolate, channelled, recurved, minutely scaly at the back. Stem simple. Spike solitary. Bractæas ovate, concave, imbricated, glaucous, smooth.—Found by Dr. Solander, on trees near Rio Janeiro, in Brasil. Said to have been introduced into the European

flaves,

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stoves, by lady Neale, about the year 1799. The *root* is somewhat tuberous, with many tough smooth fibres. *Stem* about six inches high, furrowed, and almost concealed, by the dense tuft of very numerous radical *leaves*, which are sometimes all curved to one side, five or six inches long, pale green, frosted, as it were, with hoary scaly pubescence, thickest towards the base. *Spike* three inches long, simple, many-flowered, with beautiful large white *bractæas*, tinged and tipped with rose-colour; the lower ones ending in leafy points. *Calyx* of the colour of the *bractæas*, but hardly so long. *Corolla* with obtuse, emarginate, convolute segments, at first of a rich deep blue, but finally changing to a deep red. *Capsule* dark brown, an inch long. This is, no doubt, very different from *T. monostachya*, though Linnæus's account of that species may be, as justly hinted in the Bot. Mag., incomplete. *T. striata* flowers in November. It is said to live and blossom when suspended by a thread in a warm room. Few plants are more elegant or singular.

16. *T. recurvata*. Recurved-leaved Tillandsia. Linn. Sp. Pl. 410. Willd. n. 15. Ait. n. 6. Pursh n. 1. Swartz Obs. 121. (*Viscum caryophylloides minus, foliis pruinæ instar candicantibus, flore tripetalo, femine filamentoso*; Sloane Jam. v. 1. 190. t. 121. f. 1.)—Leaves radical, awl-shaped, scaly, recurved. Stalks naked, two-flowered.—Native of the trunks of old rotten trees, in Jamaica and the Brasils, as well as in Florida and Georgia, growing in dense tufts. The *stems* are very short, clothed with crowded, spreading, recurved, sheathing *leaves*, two or three inches long, downy, with minute hoary scales. *Stalks* terminal, solitary, four inches high, slender, round, naked and smooth, each bearing at the top two upright *flowers*, enveloped in a pair of sheathing, furrowed, dotted *bractæas*. Segments of the *corolla* blue, obtuse, scarcely extending beyond the *calyx*. *Anthers* yellow. *Capsule* an inch long, slender, brown and shining, enveloped in the pale segments of the permanent *calyx*, which are as long, and nearly as broad, as the valves.—Sloane says it draws its nourishment from rain water, falling into the cavity made by the leaves.

17. *T. usneoides*. Long-moss Tillandsia. Linn. Sp. Pl. 411. Willd. n. 16. Pursh n. 2. (*Viscum caryophylloides tenuissimum, e ramulis arborum musci in modum dependens, foliis pruinæ instar candicantibus, flore tripetalo, femine filamentoso*; Sloane Jam. v. 1. 191. t. 122. f. 2, 3. *Cuscuta ramis arborum innascens, &c.*; Pluk. Phyt. t. 26. f. 5; also f. 6.)—Stem much branched, thread-shaped, twisted, minutely scaly, as well as the awl-shaped channelled leaves.—Native of shady woods from Virginia to Florida, as also of the West Indies and the Brasils, flowering in July. The long wiry contorted *stems* creep over the stems and branches of old trees, and even along a rope or hair line, if put in their way, the *roots* scarcely fixing themselves, or deriving any sustenance, from either. The *flowers* are, according to Mr. Pursh, of a yellowish-green. When the hoary shaggy coat of the plant is separated by beating or rubbing, the remains of the stems look like a mass of curling black horse-hair, and serve, like that, to stuff mattresses, &c. In this denuded state the stems are represented, along with the perfect plant, by Sloane as well as Plukenet.

M. Poiret, in Lamarck Dict. v. 7. 666—673, has greatly enriched this genus, not only with all the species published by Dr. Swartz, and which we likewise have adopted, but also with ten besides, adopted from the *Flora Peruviana* of Ruiz and Pavon. That our work may not be incomplete, we shall briefly mention these in the order in which M. Poiret has arranged them, trusting to him for the references, which we have not the means of consulting. He introduces them all,

except the last, between the *angustifolia*, our n. 14, and *recurvata*, n. 16.

18. *T. tetrantha*. Four-flowered Tillandsia. Poiret n. 9. Fl. Peruv. v. 3. 39. t. 265.—Leaves radical, lanceolate, imbricated; recurved at the point. Stem erect. Stalks reflexed, four-flowered.—Grows on trees and rocks in the forests of the Andes, flowering in July and August.—*Root* of many fibres. *Leaves* radical, large, spotted with red. *Stems* solitary, rather longer than the leaves, zigzag, clothed with oval, pointed, close, scaly *bractæas*, of a purplish rose-colour; the upper ones spreading almost horizontally, each of the latter bearing an axillary *stalk*, supporting four, nearly sessile, *flowers*. *Calyx* yellow, coriaceous. *Corolla* violet.

19. *T. maculata*. Spotted-leaved Tillandsia. Poiret n. 10. Fl. Peruv. v. 3. 40. t. 267.—Leaves radical, lanceolate-sword-shaped, shining; revolute at the point. Panicle alternately branched. Spikes nearly simple, many-flowered.—Native of rocks and trees, in the middle of the great forests of the Andes, flowering from July to September. The *leaves* are channelled, polished on both sides, covered with red or purplish spots. Every part of the plant is often red. *Stems* three feet high, simple, jointed, with an oval scale, or *bractea*, at each joint. *Panicle* terminal, eighteen inches long, red, composed of alternate, nearly simple, *spikes*, furnished with numerous, oval-lanceolate, pointed *bractæas*, reddish as well as the *calyx*. *Corolla* violet, small.

20. *T. rubra*. Red Tillandsia. Poiret n. 11. Fl. Peruv. v. 3. 40. t. 266.—Leaves radical, sword-shaped, somewhat pointed. Panicle simple, spikes undivided.—Native of rocks in Peru, flowering in March and April. The *leaves* are about two feet long, spreading or recurved; of a shining green above; silvery white beneath. *Stems* solitary, erect, two or three feet high; clothed with sheathing scales below; terminating in a straight reddish *panicle*, composed of many simple, alternate, oblong, lanceolate, divaricating *spikes*. *Bractæas* red, pointed, keeled, an inch in length. *Flowers* imbricated, sessile. *Calyx* yellowish-red. *Corolla* small, violet, with reflexed segments.

21. *T. parviflora*. Small-flowered Tillandsia. Poiret n. 12. Fl. Peruv. v. 3. 41. t. 269.—Leaves radical, awl-shaped, greatly dilated at the base. Panicle simple. Spikes from three to seven. Flowers two-ranked.—On rocks in the forests of the Andes, flowering from August to October. *Leaves* very numerous, from six to nine inches long, channelled, spreading, whitish, clothed with a multitude of mealy scales. *Stems* a foot high, slender, simple, purplish, with distant, awl-shaped, channelled, whitish, short *stem-leaves*, and oval whitish *bractæas*. *Flowers* small, white, alternate, on zigzag partial stalks. *Capsule* almost eight times as long as the *calyx*.

22. *T. biflora*. Two-flowered Tillandsia. Poiret n. 13. Fl. Peruv. v. 3. 41. t. 268.—Leaves sword-shaped, acute. Stem racemose. Flowers in pairs.—Found on the Andes, flowering in August and September. This species is often prolific. *Leaves* nearly equal, straight, spreading, striated. *Stems* solitary, simple, eighteen inches high, covered with lanceolate scaly *sheaths*, or *stem-leaves*, and terminating in a simple *chylster*, six inches long. *Flowers* on short stalks, in alternate pairs, furnished with elongated, lanceolate, striated *bractæas*, recurved and pale green at their extremity. *Capsules* yellowish, an inch long.

23. *T. purpurea*. Rose-coloured Tillandsia. Poiret n. 14. Fl. Peruv. v. 3. 41. t. 270.—Leaves sword-shaped, tapering, channelled, recurved, clothed with mealy scales. Panicle of many spikes. Flowers two-ranked.—Found on  
little

little hills about Lima, and in other sandy or stony situations in Peru, flowering in June and July. The perennial root throws out many prostrate trailing shoots. Leaves spreading, six to nine inches long, whitish. Stems solitary, a foot high, simple, clothed with long awl-shaped sheaths. Panicle rose-coloured, of from five to nine alternate spikes, with oval, concave, whitish bractees. Flowers sessile, with rose-coloured bractees and calyx. Corolla dark purple, with a white tube. Capsule pale; deep purple within.

24. *T. heptantha*. Seven-flowered Tillandsia. Fl. Peruv. v. 3. 21. (*T. heptandra*; Poiret. n. 15.)—Leaves radical, sword-shaped, tapering, very acute. Spike solitary, simple, of about seven flowers.—Native of rocks and trees, among precipices, in Peru, flowering from June to August. Leaves whitish, and rather downy. Stem near a foot high, quite simple, scaly. Flowers sessile, in two ranks, with lanceolate violet-coloured bractees. Corolla white, tipped with violet. We presume that M. Poiret has erred in his specific name.

25. *T. seffiliflora*. Sessile-flowered Tillandsia. Poiret n. 16. Fl. Peruv. v. 3. 42. t. 271.—Leaves radical, tongue-shaped, flat, obtuse. Spike solitary, simple.—Native of Peru, flowering in November and December. Root biennial. Plant smooth. Leaves eight or nine inches long, and an inch broad; the outer ones gradually smaller. Stems slender, a foot high, jointed, clothed with obtuse sheaths. Spike six inches in length. Flowers alternate, solitary, each with an oval, concave, acute bractea. Corolla of a violet purple on the inside.

26. *T. capillaris*. Capillary Tillandsia. Poiret n. 17. Fl. Peruv. v. 3. 42. t. 271. f. C.—Leaves linear-awl-shaped. Stem forked. Stalks axillary, mostly single-flowered, capillary, smooth, thrice as long as the leaves.—On rocks, walls, and trees, in Peru, flowering in November and December. This species is said to be related in many respects to the *T. recurvata*, n. 16, but differs in having forked stems; more numerous and broader leaves, contracted at their base, and not recurved; capillary flower-stalks; and solitary bractees to each flower. (We would observe that the last character is found in the *recurvata*.) The plant forms dense, leafy, whitish, tufts, the leaves being clothed with very minute mealy scales. Stems about six inches high, forked several times, furnished with two-ranked, crowded, imbricated, reflexed, linear-awl-shaped leaves, striated at their base, and half clasping the stem. Stalks straight, bearing one or two flowers, with a solitary, ribbed, smooth bractea, and a leaf at their base. Calyx scarious, deep violet. Corolla white, hardly longer than the calyx. Anthers yellow. Capsules linear, twice the length of the calyx, dark violet within.

27. *T. wirens*. Greenish Tillandsia. Poiret n. 20. Fl. Peruv. v. 3. 43. t. 270. f. B.—Leaves linear-awl-shaped. Stalks axillary, single-flowered, the length of the leaves, with a solitary convoluted bractea.—Native of rocks in Peru, flowering in December and January.—A small species, forming dense, proliferous, whitish, warty tufts. Leaves imbricated in two rows, reflexed at the point, striated at the base. Flowers pale yellow. Capsule green, twice the length of the calyx; internally dark-purple.

TILLANJONG, in *Geography*, one of the Nicobar islands, in the Indian sea. N. lat.  $8^{\circ} 40'$ . E. long.  $94^{\circ} 9'$ .

TILLE, LA, a river of France, which runs into the Saône, about 3 miles below Auxonne.

TILLÉ, a town of France, in the department of the Oise; 3 miles N. of Beauvais.

TILLEE, a town of Bengal; 28 miles N.W. of Dacca.

TILLEMANS, PETER, in *Biography*, was born at

Antwerp in 1684, and visited England in 1708, where he attracted attention by his excellent copies from the pictures of Bourgoigne and Teniers, of whose works he preserved the freedom and spirit. He also painted landscapes with small figures, views of gentlemen's seats, sea-ports, &c. and met with very considerable employment. The duke of Devonshire favoured him, and for him he painted a picture of Chatsworth, which gained him considerable eclat. He died here in 1734.

TILLEMONT, LOUIS SEBASTIAN LE NAIN DE, a French ecclesiastical writer, was born at Paris in 1637; and in the school of the Port-Royal, into which he was admitted at the age of ten, he discovered promising talents and a pious disposition. From early life he devoted himself to the study of ecclesiastical antiquity, and made collections, principally relating to the first six centuries, with a view of composing a history of the church. Modest and diffident, as well as learned, he deferred taking priests' orders till his 40th year; and having done this, he declined all preferment, and retired first to Port-Royal-des-Champs, and then to Tillemont, near Vincennes, prosecuting his literary labours, and keeping in view his main object: he subjected himself at the same time to very rigid penitentiary discipline. His austerities and intense application debilitated his constitution to such a degree, that he died in 1698, at the age of 61 years.

The plan of his great work comprehended two parts, viz. the secular and the ecclesiastical history of the period of which he proposed to treat. Accordingly the first part, entitled "Memoires pour servir a l'Histoire Ecclesiastique des six premiers Siècles," was comprised in 16 vols. 4to. of which four volumes were published in his life-time, and twelve more after his death. The other part, entitled "L'Histoire des Empereurs et des autres Princes qui ont regné durant les six premiers Siècles de l'Eglise," consists of 6 vols. 4to. the last being left in MS. and not published till 1738, finishing with the emperor Anastasius. Dupin, though he disapproves the method of Tillemont, observes, that great instruction may be derived from his history, especially with respect to critical and chronological matters. His style merits no commendation. Gibbon, who often quotes his History of the Emperors, and praises his scrupulous accuracy, finds frequent occasion to censure his bigotry, and remarks, that "he never dismisses a virtuous emperor without pronouncing his damnation." Moreri. Gen. Biog.

TILLENENSEE, in *Geography*, a lake of Prussia, 8 miles W. of Lick.

TILLER, or TILLAR, in *Husbandry*, a little young tree, left to grow till it be fellable.

TILLER is also a term used by farmers to signify, that the produce of the grain branches out into several stalks; in which sense it denotes the same thing with the Latin word *fruticare*.

It has been suggested by the writer of the "Elements of Agricultural Chemistry," that in the tilling of corn, that is, the production of new stalks round the original plume, there is every reason to believe that oxygen must be absorbed; for the stalk at which the tilling takes place, always contains sugar, and the shoots arise from a part which is deprived of light. The drill-husbandry is therefore supposed to favour this process; as loose earth is thrown by the hoeing round the stalks; and they are preserved from light, and yet supplied with oxygen. The writer has counted from forty to one hundred and twenty stalks produced from a grain of wheat, in a moderately good crop of the drilled kind. And we are informed, it is said, by sir Kenelm Digby, in 1660, that there was

in the possession of the fathers of the Christian doctrine at Paris, a plant of barley, which they, at that time, kept by them as a curiosity, and which consisted of two hundred and forty-nine stalks springing from one root, or grain; and in which they counted above eighteen thousand grains, or seeds of barley.

It is noticed, too, that the great increase which takes place in the transplantation of wheat, depends upon the circumstance, that each layer thrown out in tillering may be removed, and treated as a distinct plant.

The following statement is given in the fifty-eighth volume of the Philosophical Transactions, at p. 203: Mr. C. Miller of Cambridge sowed some wheat on the 2d of June, 1766; and on the 8th of August, a plant was taken and separated into eighteen parts, and replanted; these plants were again taken up, and divided in the months of September and October, and planted out separately to stand the winter, which division produced sixty-seven plants. They were again taken up in March and April, and produced five hundred plants: the number of ears thus formed from one grain of wheat was twenty-one thousand one hundred and nine, which gave three pecks and three-quarters of corn, that weighed 47lbs. 7 oz.; and that were estimated at five hundred and seventy-six thousand eight hundred and forty grains.

There is a number of facts and cases of the vast increase of grain crops by tillering, scattered through the writings on agriculture and husbandry, which clearly shew the great utility and importance of it in the raising of such crops.

**TILLER of a Ship**, a long piece of timber (which should be straight-grained and free from knots) fitted into the head of the rudder as a lever, to turn it from one side to the other, in order to steer the ship. This term, or *bich*, is used for the handle of a boat's rudder.

**TILLER-Rope**, a kind of tackle, communicating with the ship's side, and usually composed of untarred rope-yarn for the purpose of traversing more readily through the blocks or pulleys: this tackle serves to guide and assist the operations of the tiller, and in all large vessels is wound about a wheel, which acts upon it with the powers of a crane or windlass.

**TILLERING**, in *Agriculture*. See **TILLER**.

**TILLEWALL**, in *Geography*, a town of Prussia, in Oberland; 5 miles N.E. of Eylau.

**TILLIERES**, a town of France, in the department of the Eure; 6 miles N.E. of Verneuil.

**TILLING**, a town of Sweden, in the province of Up-land; 23 miles S.E. of Upsal.

**TILLIUM**, or **TILIUM**, in *Ancient Geography*, a town on the western coast of the isle of Sardinia, between the promontory Gorditanum and port Nymphæus. Ptol.

**TILLONGCHOOL**, or **KATCHAL**, in *Geography*, one of the Nicobar islands, of a triangular form, about 36 miles in circumference. N. lat. 7° 58'. E. long. 93° 50'.

**TILLOT, LE**, a town of France, in the department of the Vosges; 12 miles S.E. of Plombières.

**TILLOTSON, JOHN**, in *Biography*, a celebrated English prelate, descended from an ancient family in Cheshire, was the son of Robert Tillotson, a clothier at Sowerby, in the parish of Halifax, Yorkshire, where he was born in the year 1630. Having been brought up in the principles of his father, who was a Calvinistic puritan, and discovering an inclination to literature, he was entered in his 17th year a pensioner of Clare-Hall, Cambridge. In 1651 he was elected fellow of his college, and took pupils, to whose moral and religious instruction he was duly attentive. At this time, he was in his sentiments Calvinistic, heard such

preachers, and used extemporaneous prayer. His views of theology were enlarged soon after he left college in 1656, by the perusal of Chillingworth's "Religion of Protestants." But retaining his attachment to the Presbyterian form of church government, he was received into the family of Edmund Prideaux, attorney-general to the Protector, as chaplain and tutor to his son. He attended the Savoy conference in July 1661, and preached a sermon (the first which he preached) at their morning exercise in Cripplegate, in the month of September. Under the Act of Uniformity in 1662, to which he submitted, he became curate at Cheshunt, in Hertfordshire. In London he was much admired as a preacher, and was chosen minister by one of the parishes, but declined accepting the office, because the vacancy had been occasioned by the refusal of Mr. Edm. Calamy to comply with the Bartholomew Act. From a rectory in Suffolk, to which he was presented, he removed to the office of preacher to the society at Lincoln's Inn. In 1664 he married the daughter of Dr. French, canon of Christchurch, by a sister of Oliver Cromwell; and in 1665 he was appointed lecturer to the parish of St. Laurence Jewry. His reputation as a preacher was very considerably increased at this time by his printed sermon, "On the Wisdom of being religious." His controversy on popery commenced with the publication of his "Rule of Faith," in answer to a book written by a convert to the Romish church. The part he took in a scheme for comprehending dissenters under the establishment, evinced his respect for that description of Christians and Protestants. (See **COMPREHENSION**.) In 1666 he took his degree of D.D., and in 1669 he was made a king's chaplain, and was presented to a prebend of Canterbury. When king Charles, in 1672, issued a declaration for liberty of conscience, with a view of favouring the Roman Catholics, the bishops took the alarm, and recommended to the clergy to preach against popery. The king was displeased, and Tillotson, at a meeting of the clergy convoked by the bishop of London, suggested the following apology for their conduct: "That since his majesty professed the Protestant religion, it would be an unprecedented thing that he should forbid his clergy to preach in defence of a faith which they believed, and which he declared to be his own." Soon after this he preached a sermon at Whitehall on the hazard of salvation in the church of Rome; and yet, offensive as this sermon must have been, he was advanced, in 1672, to the deanery of Canterbury, which was followed, in 1673, by a presentation to a prebend of St. Paul's. At this time he published Dr. Wilkins's "Principles of Natural Religion," with a recommendatory preface; and the author, who died in his house, committed to him the disposal of his papers. A similar trust was reposed in him by Dr. Barrow. His dread of popery induced him, in 1680, to preach before the king a sermon, afterwards published by the royal command, and entitled "The Protestant Religion vindicated from the Charge of Singularity and Novelty." In this sermon a paragraph was introduced which incurred the charge of intolerance. "I cannot think," says he, "till I be better informed, which I am always ready to be, that any pretence of conscience warrants any man that is not extraordinarily commissioned, as the apostles and first preachers of the gospel were, and cannot justify that commission by miracles, as they did, to affront the established religion of a nation, though it be false, and openly to draw men off from the profession of it, in contempt of the magistrate and the law. All that persons of a different religion can in such a case reasonably pretend to is, to enjoy the private liberty and exercise of their own conscience and religion, for which

they ought to be very thankful, and to forbear the open making of profelytes to their own religion, (though they be never so sure that they are in the right,) till they have either an extraordinary commission from God to that purpose, or the providence of God make way for it by the permission of the magistrate." The king slept while the preacher delivered the sermon, but a nobleman at the close of it said to him, "It is a pity your majesty was asleep, for we have had the rarest piece of Hobbism that ever you heard in your life," to which Charles replied, "Oddsfish, then he shall print it," which was the cause of the order. The paragraph was unworthy of Dr. Tillotson, and gave very general offence, both to the established clergy and Presbyterians. Tillotson was an ardent promoter of the Bill of Exclusion, nor would he concur in the address of the London clergy to the king on his declaration that he could not consent to such a bill. In 1682 he took occasion to vindicate the character of Dr. Wilkins from the aspersions of Anthony Wood, by a preface to a volume of sermons, which he published from the doctor's MSS. He was also the editor, in 1683, of Dr. Barrow's sermons, in 3 vols. fol. It has been regretted as an inconsistency in the character of Tillotson, that when in company with Burnet he attended lord Russel preparatory to his execution, they should urge this martyr to liberty to acknowledge the absolute unlawfulness of resistance, though they were soon after decided friends to the revolution. By a "Discourse against Transubstantiation," and another "Against Purgatory," he commenced a prolonged controversy with the Papists. In 1685 he avowed himself a warm advocate for affording charitable relief to the French refugees, on the repeal of the edict of Nantes; and in reply to Dr. Beveridge, the prebendary of Canterbury, who objected to reading a brief for this purpose, as contrary to the rubric, he reinterfrated, by saying, "Doctor, Doctor, charity is above rubrics." After the settlement of the prince of Orange at St. James's, he was instrumental in persuading the princess Anne, who consulted him, to acquiesce in giving up her claim to the crown during the life of William, in case of her sister's dying before him. After the revolution, no obstacle remained to the full gratification of his desires of advancement, which, however, he professed to be very limited. In 1689 he was appointed clerk of the closet to the king, and permitted to exchange the deanery of Canterbury for that of St. Paul's. During archbishop Sancroft's suspension for refusing to take the oaths to the new government, Dr. Tillotson was appointed to exercise the archiepiscopal jurisdiction; and it was then determined that he should have possession of the see. His whole conduct at this time evinced his attachment to the principles of toleration and civil liberty; and he was active in his endeavours for promoting a comprehension, though they ultimately proved unsuccessful. He also failed in introducing a new book of Homilies; and in a sermon preached before the queen, against the absolute eternity of hell torments, he excited the resentment and opposition of the orthodox party. After some reluctance on his part, he was consecrated to the archbishopric of Canterbury in May 1691, and also in a little while sworn a member of the privy-council. From this time he became very obnoxious to the high-church zealots, who attacked him in a variety of ways. Among other charges against him, one was his attachment to Socinian principles, which seems to have had no other foundation than his rational defence of Christianity, and his friendship and intercourse with Locke, Limborch, and Le Clerc; and for repelling which, he caused to be republished, in 1693, four of his sermons "On the Divinity and Incarnation of our

Saviour."—"If this be Socinianism, for a man to inquire into the grounds and reasons of the Christian religion, and to endeavour to give a rational account of it," says he in one of his posthumous sermons, alluding to this charge, and also to the character of Chillingworth, "I know no way but that all considerate inquisitive men, that are above fancy and enthusiasm, must be either Socinians or Atheists." Dr. Jortin, in reference to this unfounded accusation, observes, "Tillotson had made some concessions concerning the Socinians, which never were, nor ever will be, forgiven him, and had broken an ancient and fundamental rule of theological controversy: 'Allow not an adversary to have either common sense, or common honesty.'" After an examination of bishop Burnet's exposition of the thirty-nine articles, which he sent him in MS., he concludes his eulogy on the bishop's prudence and ability with observing, "The account given of Athanasius's creed seems to be no-wise satisfactory; I wish we were well rid of it." The archbishop's assiduity and zeal in the duties of his exalted station were highly exemplary and laudable; and yet they were not sufficient to silence the clamours of his enemies. At length the period of his usefulness terminated, in consequence of a paralytic stroke, which seized him, November 1694, in the chapel of Whitehall, and which, on the fifth day, proved fatal, in the 65th year of his age. His funeral, at the church of St. Laurence Jewry, was attended by many persons of rank. He left a widow, but no children; and as he took no pains to accumulate property, his debts could not have been paid, if the king had not remitted his first-fruits; and the copy-right of his sermons was the only provision which he left for his widow, to which a pension, settled upon her by the crown, was added.

"The temper and character of Dr. Tillotson," says one of his biographers, "were intitled to every encomium. He was humble, open, and sincere, of kind and tender affection, extremely bountiful in his charities, and forgiving of injuries, in which last virtue he was severely tried. His public principles bore the stamp of his disposition; they were philanthropical, tolerant, and liberal; and if he retained some predilections for the sect in which he had been educated, the chief professional fault with which he has been charged, candour will make due allowance for the effect of early habit. In some points he was, perhaps, too compliant, and was led into some inconsistencies; but the times were difficult, and his intentions seem to have been always pure. As a writer, he is principally remembered for his sermons, which have long maintained a place amongst the most popular compositions of that class in the English language. A folio volume, comprising his "Rule of Faith," and sermons, was printed in his life-time; and after his death two more folio volumes of sermons were published by his chaplain, Dr. Barker. Abroad, as well as at home, his works have been held in high estimation. The character given of them by Le Clerc, in his "Bibliotheque Choisie," is as follows: "The archbishop's merit was beyond any commendation he could give. It consisted in the union of extraordinary clearness of head, great penetration, an exquisite talent of reasoning, a profound knowledge of genuine theology, solid piety, a most singular perspicuity, and unaffected elegance of style; with every other quality that could be desired in a man of his order; and whereas compositions of this kind are commonly mere rhetorical and popular declamation, better to be heard from the pulpit than read in print, his are for the most part exact dissertations, capable of bearing the test of the most rigorous examination." Addison considered the sermons of Tillotson as a standard of purity of the English language. Dryden acknowledged,

that

that if he had any talent for English prose, it was derived from frequent perusal of Tillotson's writings. Mr. Melmoth, however, in his "Fitz Osborne's Letters," expresses a very different, and in our judgment a less just, or to say the least of it, a less candid opinion. He speaks of "his words as frequently ill chosen, and almost always ill placed; his periods as tedious and unharmonious; and his metaphors as generally mean, and often ridiculous." Notwithstanding these reflections, Tillotson's sermons, though surpassed by the correctness and elegance of modern compositions in this department, and less perused than formerly, will not cease to be regarded as a valuable part of English literature. Birch's Life of Archbishop Tillotson. Biog. Brit. Gen. Biog.

**TILLS**, in *Agriculture*, a term signifying tares or vetches in many places, in both the northern and southern parts of the kingdom.

**TILLURAH**, in *Geography*, a town of Bengal; 21 miles E.N.E. of Purneah.—Also, a town of Hindoostan, in Bahar; 22 miles S. of Patna. N. lat.  $25^{\circ} 14'$ . E. long.  $85^{\circ} 22'$ .

**TILLY**, a town of Canada, on the St. Laurence; 10 miles S.W. of Quebec.—Also, a town of France, in the department of the Meuse; 9 miles S. of Verdun.—Also, a town of France, in the department of the Eure; 7 miles S.E. of Grand Andelys.—Also, a town of France, in the department of the Sambre and Meuse; 6 miles W. of Gemblours.

**TILLY la Campagne**, a town of France, in the department of the Calvados; 4 miles S.S.E. of Caen.

**TILLY Verolle**, a town of France, in the department of the Calvados; 9 miles W. of Caen.

**TILLY Land**, in *Agriculture*, that sort which is, for the most part, constituted and composed of materials of the till kind.

These kinds of land, in their original states, are in general of a very barren and unproductive nature; but when they have been fully turned over by the plough or other means, well and effectually wrought and reduced by other proper tools, and their parts completely divided and exposed to the alternate action of different agents, such as those of frost and thaw, of drought, dews, and rain, with the many other improving effects of the atmosphere which surrounds them; and withal stimulated, separated in their parts, and enriched by calcareous and other suitable manures and substances, they become, in various instances, of a far less strong and stubborn nature, and greatly more disposed to the raising of good and plentiful crops upon them. They are commonly much ameliorated and improved at first by growing beans, tares, and rape in succession with wheat and other suitable sorts of grain, having the green crops so managed as to stand as close, thick, and smothering as possible on the land. See **LAND** and **SOIL**.

**TILMUS**,  $\tau\acute{\iota}\lambda\mu\omicron\varsigma$ , a term used by some of the medical writers to express the effect of a sort of delirium, in which people pull the bed-cloaths, or pick out threads from the sheets. This is usually esteemed a dangerous symptom.

**TILNOR**, in *Geography*, a town of Bengal; 60 miles N.N.W. of Midnapour.

**TILO-GRAMMUM**, **OUGLI**, or *Ongli*, in *Ancient Geography*, a town of India, situated, according to Ptolemy, to the right of the most western arm of the Ganges, about  $23^{\circ}$  lat.

**TILOTAMA**, a nymph celebrated for her beauty in the mythological and amatory poems of the Hindoos. She appears to have been one of that numerous class of females, who, under the name of Upsara, arose from the churned

ocean, as described under our article **KURMAVATARA**: a fable as prolific of poetical incident, and as often referred to, as any in the whole range of invention. The chief of these Upsaras, or water-nymphs, was Rhenba, of whom some mention is made under her name in this work. They are described in numerous Hindoo poems with all the warmth and fancy that may be predicated of "youthful poets when they love;" and in terms too glowing for readers beyond the tropics. Under the name of another of these beautiful damsels, **MENAKA**, we have said something of them. See also **UPSARA**.

The name of the elegant nymph, the subject of this article, occurs in an inscription on a copper-plate found in the Deccan, bearing date A.D. 1359. The inscription is given in the 9th volume of the Asiatic Researches, and records a grant for pious purposes. After much adulation of the mother of the royal donor, it is said that "by the charms of her graceful gaiety she obscured Tilotama."

**TILOUTTAH**, in *Geography*, a town of Hindoostan, in Bahar; 10 miles S.S.E. of Saferam. N. lat.  $24^{\circ} 48'$ . E. long.  $84^{\circ} 15'$ .

**TILOX**, in *Ancient Geography*, a promontory on the northern coast of the island of Corfica, between the mouth of the river Valerius and Cæsæ Littus.

**TILPHOSSÆUM**, a small country of Greece, in Thessaly.

**TILSIT**, in *Geography*, a town of Prussia, in the Lithuanian department, large, rich, and commercial. It obtained the privileges of a city in the year 1552, though the castle is said to have been standing so early as 1289. The river Memel, which runs along the N. side of the town, opens to it a very advantageous trade with Königsberg, in corn, linseed, butter, and other provisions. Tilsit, properly so called, consists of two long streets, of a proportionate breadth, which are called the German-street and the High-street, contiguous to which are the suburbs called the "Liberty." The number of houses in this city is about 600, and the inhabitants amount to 7000 souls. The ecclesiastical buildings are an evangelic or Lutheran German church, a Lithuanian church, and a Calvinist or reformed church. Without the town is a Lutheran chapel, and about an English mile from it a Roman Catholic chapel. The flat country about Tilsit, which is about 16 miles in length, and as many in breadth, is one of the most fertile spots in the whole kingdom: the inhabitants of it breed great numbers of horned cattle, and furnish not only Prussia, but likewise other provinces, with excellent butter and cheese; and the fisheries in this place are also considerable. The horses are large and strong, but clumsy. Barley is almost the only grain sown in these parts, which afford little or no wood. The marsh-land is, in spring, exposed to inundations by the overflowing of the rivers, which often do great damage. In 1807, it was taken by the French; soon after which a peace was made between France, Russia, and Prussia, called the "Peace of Tilsit; 50 miles N.E. of Königsberg. N. lat.  $55^{\circ} 8'$ . E. long.  $22^{\circ} 8'$ .

**TILT**. See **TOURNAMENT**.

**TILT**, in *Rural Economy*, a term signifying the arched or other covering of a cart, waggon, or other carriage.

The hoops for supporting the tilts in these cases, may be fastened upon the sides of the carriage-frames, after being properly prepared and bent in a sort of half-circular manner, in several different ways, but the fastening by means of screws is probably the best, where they are to remain fixed.

**TILT-Boat**, a boat covered with a tilt, *i. e.* a cloth, or tarpawling, sustained by bails or hoops over the stern, for

the sheltering of passengers. Such are some of those which carry passengers between London and Gravesend.

*Tilt-Hammer*, is a large and heavy hammer, adapted to be put in rapid motion by the power of a water-wheel or steam-engine.

The tilt-hammer is distinguished from the lift-hammer, or forge-hammer, by the manner in which it is lifted up by the cogs of a wheel which is turned by the mill.

The forge-hammer is mounted on a centre of motion at the extremity of the haft or helve of the hammer opposite to the head of the hammer, and the cogs of the wheel operate beneath the helve near the head, to lift or tofs up the hammer against a strong wooden spring called the rabbit, which is firmly fixed over the head of the hammer. This spring reflects the hammer down upon the anvil with greater force and smartness than the hammer would descend by the action of gravity alone. A lift forge-hammer is described under the article IRON. See *Plate IV. Iron Manufacture*.

The tilt-hammer is poised on pivots or a centre of motion, which is about the middle of the length of the helve, or sometimes at two-thirds from the head. The cogs of the wheel are made to act on the tail of the helve beyond the centre of motion, and they press down the end of the tail, and thus cause a correspondent elevation of the head of the hammer. Sometimes the spring is placed over the head of the hammer, the same as a lift-hammer; but more commonly, the tail of the hammer is made to strike against a fixed floor; and when the head of the hammer is thrown up suddenly, the momentum given to it causes the head to rise up after the tail strikes the floor, and thus bends the helve, which by its elasticity causes the head of the hammer to descend smartly upon the anvil.

The *tilt-mills* in the neighbourhood of Sheffield are very simple: they are worked by a small water-wheel, upon the axis of which is a wheel with a great number of cogs, fixed in its circumference. These successively depress the tail of the hammer, and raise its head: the hammer falls by its own weight, aided by the spring of the helve, upon the hot metal. The size of the water-wheel, and the number of cogs in the wheel, are adapted to produce from three hundred to four hundred strokes *per* minute.

This great number requires the water-wheel to move with a velocity which is inconsistent with the best mode of applying the fall of water, because it is well known that water, as well as any other heavy body, can only descend with a certain speed. If, therefore, the floats of the wheel are required to turn with a great rapidity, it is evident the proportion of work the wheel will perform, will be but small in proportion to the quantity of water expended. For this reason, it is found to be a great improvement in tilt-mills to add cog-wheels which will give the hammers a sufficient velocity, while the water-wheel turns at such a rate as is found to produce the greatest power from a given quantity of water.

A capital mill of this kind is delineated in *Plate VIII. Iron Manufacture*. It was made at the Carron iron-works in Scotland, after designs of the celebrated Mr. Smeaton. It is adapted for forging iron into bars, and has three tilt-hammers of different powers for different kinds of work. These hammers are not made to strike so quick as is usual in the Sheffield mills for the tilting and drawing out steel bars; but by giving a greater number of cogs to the wheels, the requisite rapidity may be obtained without increasing the speed of the water-wheel. A capital mill was built at Sheffield about six years ago, which is on Mr. Smeaton's plan, except in the proportions of the wheels, and its performance is superior to any of the other tilt-mills.

A A, in the plan *fig. 1*. are the walls of the building; BB the great water-wheel, which is of the kind called a breast-wheel. (See *WATER-WHEEL*.) It is 18 feet diameter and 5 feet broad. The total descent of the water which actuates it is 7 feet 2 inches, and it falls upon the float-boards rather below the centre of the wheel, being retained against the floats by what is called the breaking, that is, a sweep or curved wall of masonry, which is accurately adapted to the float-boards of the wheel, and as close to them as is possible, to avoid touching.

The axis C of the water-wheel is carried through the wall A, and on the extreme end of it is a large iron wheel D, of 90 wooden teeth, 9 feet 6 inches diameter. This turns a pinion E of 30 teeth, and 3 feet 2 inches diameter. The pinion is fixed on one end of a cast-iron axis G G, which is made very large, for strength, and hollow within, like a pipe. The gudgeons *b* and G are fixed into it at each end, and upon these gudgeons it revolves. FF is a cast-iron fly-wheel, fixed on the axis close to the pinion; it is 12 feet diameter, and the rim 6 inches by 5. The weight is very considerable, and gives it a momentum to regulate the motion of the whole mill, and equalize all irregularities which arise from the successive actions of the mill to raise the three hammers, L, M, and N.

Each hammer has a separate cog-wheel, K, I, and H, to give it motion, which is effected by the cogs of these wheels acting upon the tails of the hammers and pressing them down. This is explained by the elevation *fig. 2*. where *e* is the iron head of the hammer, *f* its centre of motion, and *d* the tail or extreme end, upon which the cogs of the wheel act, and which is plated with iron on the upper side, to prevent it from wearing.

P is the anvil-block, which must be placed on a very firm foundation, to resist the incessant shocks to which it is subjected: the centre, *f*, or axis of the hammer, is supported in a cast-iron frame, *g b*, called the *hirst*. When the cogs of the wheel strike the tail of the hammer suddenly down, and raise the head, the lower side of the tail of the hammer strikes upon a support *n*, which acts to stop the ascent of the head of the hammer *e*, when it arrives at the desired height; but as the hammer is thrown up with a considerable velocity as well as force, the effort of the head *e* to continue its motion, after the tail strikes the stop *n*, acts to bend the helve L of the hammer, and the elasticity of the helve recoils the hammer down upon the anvil with a redoubled force and velocity to that which it would acquire from the action of gravity alone.

To obtain this action of recoil, the *hirst g b* must be held down as firmly as possible; and for this purpose, four strong iron bolts are carried down from the four angles of the bottom plate *b*, and made fast to the solid basis of stone R R, upon which the whole rests: upon this basis are placed four layers of timbers, *i, k, l, m*, which are laid one upon another, and the timbers of each layer are laid crossways over the others. Each layer consists of several pieces laid side by side, and they are slightly treenailed together, to form a platform. Each platform is rather less than that upon which it rests, so as to form a pillar of solid timber; on the top of which the *hirst-frame g b* is placed, and firmly held down by the four bolts, which descend through all the platforms, and have secure fastenings in the solid masonry beneath.

The stop *n* is supported by a similar pillar, but smaller, and composed of three layers: the upper piece *n*, which is seen crossways in *fig. 2*, is about three feet long, and the under side is hollowed, so that the piece bears only upon the two ends, leaving a vacancy beneath it, which occasions

it to bend or spring every time the tail *d* of the hammer strikes upon it, and this aids the recoiling action very much.

The axis on which the hammer moves is formed by a ring of cast-iron, through which the helve of the hammer is put, and held fast by wedging round it. The ring has a projecting trunnion on each side, ending in an obtuse conical point, which is received in a socket firmly fixed in the first-frame *g h* by screws and wedges, one of which is seen at *r*. These two sockets are thus capable of adjustment, so as to make the hammer face fall flat upon the anvil. The three wheels K, I, H, are of different sizes and numbers of cogs to produce that velocity in each hammer which is best adapted for the work it is to perform: thus, the wheel K for the great hammer has eight cogs, and therefore produces eight blows of the hammer for each revolution of the fly-wheel; the wheel I for the middle hammer has twelve cogs; and the wheel H for the small hammer sixteen; the latter will therefore make two strokes for every one of the great hammer. In fixing the three wheels upon the great shaft G H, care is taken that they shall produce the blows of the different hammers in a regular succession, and equalize as much as possible the force which the water-wheel must exert. The wheels are fixed upon the shaft by means of a wedging of hard wood, driven in all round; the wood, being capable of yielding a little to the shocks occasioned by the cogs meeting the tails of the hammers, renders the concussions less violent.

The following are the principal dimensions:

The head of the great hammer, P, weighs  $3\frac{1}{4}$  cwt., and it is intended to make 150 blows *per* minute: it is lifted 17 inches from the anvil at every blow.

The middle hammer, M, is 2 cwt., and makes 225 blows *per* minute: it is lifted 14 inches each time.

The small hammer, N, weighs  $1\frac{1}{2}$  cwt., and makes 300 blows *per* minute: it is lifted only 12 inches.

To produce these velocities, the great axis G must make  $18\frac{3}{4}$  turns *per* minute; and the cog-wheels E and D, being in the proportion of one to three, the water-wheel must make  $6\frac{1}{4}$  revolutions *per* minute; the water-wheel being 18 feet diameter, its circumference will be  $18 \times 3.1416 = 56.54$ , or  $56\frac{1}{2}$  feet: this multiplied by 6.25 is about 353 feet motion *per* minute, or divided by 60 = 5.9 feet motion *per* second for the circumference of the water-wheel.

The tilt-mills employed in the manufacture of steel, do not have the great hammer P, but the largest they use is about the size of that at M, and is adapted for welding faggots of steel to make shear steel: the other two hammers are about the size of N, and are made to work much quicker, *viz.* from 350 to 400 blows *per* minute. This is very easily accomplished by making the wheels E and F as 1 to 4, instead of 1 to 3, as shewn in the drawing.

**TILTH**, in *Agriculture*, a term used to signify the condition of the earth or soil after the land has been ploughed and broken down by the harrow or other tool of the same kind; or the state and circumstances of the ground in regard to tillage, or heat, as relating to manure. Thus we have a *good* and *bad* tilth, as well as land *in* and *out* of tilth, in works on agriculture.

**TILTIL**, in *Geography*, a town of Chili; 30 miles S.E. of Valparayso.

**TILTING of Steel**, the process by which blistered steel, or steel in the raw state, is rendered ductile and fit for the purposes of various manufactures. Tilting consists in hammering or forging the steel by a large hammer called a *tilt*. See **TILT-Hammer**.

*Steel* is formed by two processes: one in which it is made at once from pig or crude iron in the finery, nearly in

the same manner as making bar-iron: this is called natural steel. In the second process, malleable iron, in bars, is imbedded in charcoal or other carbonaceous matter, and exposed to a considerable heat, till the carbon is thought to have penetrated sufficiently into the iron to have changed it into steel. This is called converting the iron by cementation with charcoal; and the furnace in which the operation is performed is called a converting furnace.

The object of this process of cementation, is to impregnate the iron with a certain quantity of carbon, to be derived from the charcoal: like many other simple operations, it requires great care and nicety to perform it properly, when put in practice on a large scale. The iron must be exposed to the action of an intense heat in contact with carbon (but defended from the access of oxygen), until the iron imbibes a portion of carbon and becomes steel.

The quantity of carbon which must be combined with iron to produce steel, admits of considerable latitude, and the qualities of the steel vary in the same proportion: with too little carbon, steel will be soft; and not sufficiently hard when it has been suddenly cooled by plunging in water. It has a rough and somewhat fibrous fracture, and in general may be said to possess many of the qualities of malleable iron. On the other hand, in proportion as the quantity of carbon is diminished, an over-cemented steel, containing an excess of carbon, is brittle, easily fusible, excessively hard after being suddenly cooled, and is liable to crack on the sudden change of temperature from hot to cold. All these properties are an approach to crude iron.

The received opinion respecting steel and the best cast-iron is, that they have the same constituent parts, but in different proportions; the former containing a smaller proportion of carbon than the latter. All the crude or cast-iron of commerce contains oxygen in greater or less proportion, but the best steel is supposed to be nearly free from this. Mr. David Musket, whose great practical and theoretical knowledge entitles his opinion to the greatest respect, supposes that the carbon contained in cast-iron and in steel, exists in very different states; and that steel is a combination of iron with pure carbon, similar to the diamond, but that crude iron, is iron containing the oxyd of carbon, which is charcoal. This opinion he founded upon the result of a very numerous series of experiments, many of which he communicated to the Philosophical Magazine, vol. xiii. He found that a piece of Swedish bar-iron, weighing 885 grains, introduced into a Stourbridge clay crucible, and half its weight (442 grains) of charcoal well prepared; a clay cover, fitting exactly, being placed on, and the whole exposed to a moderate heat for half an hour; that the result was, a perfect button of super-carbonated crude iron, weighing 928 grains, which therefore had gained  $\frac{1}{70}$ th on its original weight; while the charcoal, which remained in the crucible in an intensely black state, weighed 290 grains, having lost 34.4 *per cent.* of its original weight.

In a second experiment, made in a similar manner, but with only a quarter of the charcoal, the iron gained  $\frac{1}{19\frac{1}{10}}$  of its

original weight, and the loss in charcoal was 45 *per cent.*: the metal was richly carbonated. When one-sixth of charcoal was used, the iron produced, resembled the produce of No. 1. and 2. of the crude iron of commerce; its weight was increased

$\frac{1}{20\frac{3}{4}}$ ; and 57 *per cent.* of the charcoal disappeared in the process.

With one-eighth of charcoal, the iron gained  $\frac{1}{22\frac{1}{5}}$  of its original

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original weight; and the weight of the charcoal which disappeared was  $67\frac{2}{5}$  per cent. The metallic button was very highly carbonated, and apparently formed an entire mass of carburet.

One-ninth of charcoal produced a super-carbonated button of crude iron, rather inferior to the preceding in point of carbonization: its surface was smooth, and of a dull lead-colour, entirely free from the usual shining specks of carburet, which very rich crude iron contains upon its surface. It had gained equal to  $\frac{1}{2}$ th in weight by the fusion; and the loss in charcoal was 80 per cent.

When treated in the same manner with  $\frac{1}{2}$ th of its weight of charcoal, the iron gained weight equal to  $\frac{1}{7}$  parts: and 83.5 per cent. of the charcoal disappeared in the process. The metallic button possessed an uniformly smooth surface, partially covered with carburet.

One-fifteenth part of charcoal, exposed with the iron to a heat sufficient to melt it, was all lost; the metal gained  $\frac{1}{3}$ th in weight, which was exactly half the weight of charcoal lost. The surface of the button was not carbonated, as the foregoing experiments: the colour was blueish-black, smooth in the centre, but a little oxydated towards the edges. The fracture was that of close dark-grey crude iron; the crystals much closer and more minute than in the preceding experiments. Its quality was such as manufacturers term No. 2. grey melting pig-iron.

When only  $\frac{1}{10}$ th part of charcoal was employed, none of which remained after the fusion, the iron gained  $\frac{1}{15}$  parts in weight: a small portion of amber-coloured glass was found round the edges of the button. The fracture of the metal was smooth silvery-white, occasionally studded with carbonaceous specks in form of small grains: it exactly resembled mottled pig-iron.

With  $\frac{1}{15}$ th part of charcoal, the metal gained  $\frac{1}{17}$  parts in weight, the whole of the charcoal disappearing. The upper surface of the button was smooth, but the under considerably pitted. The concaves were chequered with the rude crystallization peculiar to cast-iron. Its fracture was bright silvery-white, destitute of grain, and exhibiting a very perfect streaky crystallization slightly radiated: its resemblance was strikingly similar to that of highly-blown crude iron, prepared in the finery for making malleable iron.

A piece of Swedish iron was placed in  $\frac{1}{10}$ th its weight of charcoal: the fusion of the mixture produced a metallic button weighing  $\frac{1}{17}$  parts more than the iron employed, which increase is not quite a quarter of the loss in charcoal, which wholly disappeared in the experiment. The upper surface of the button was smooth without configuration, but the under surface was uneven, and covered with minute but perfect crystallization: its fracture was blueish silvery-white, composed of flat dazzling crystals, proceeding in lines from a centre to the edges of the button. Here it was evident, that from the small proportion of carbon combined with the iron, it was found to assume the earliest stage of granulation approaching to the state of steel. The brilliant concretions observable in the surface of the button were too indistinct and flat for steel capable of bearing the hammer.

When the proportion of the charcoal was reduced to  $\frac{1}{20}$ th of the iron, its consequent increase was but  $\frac{1}{20}$ th part. The upper surface of the button was smooth, with a faint impression of a chequered crystallization: the under surface possessed some large pits similarly though more perfectly crystallized; the fracture was one shade of blue beyond the last experiment. A regular granulated surface, composed of flat oblong crystals, was observable, still too indistinct and too much on edge for workable steel.

With only  $\frac{1}{24}$ th of the weight of charcoal, the button was deficient  $\frac{1}{24}$ th part of its weight originally used, yet

the whole of the charcoal was lost. The surfaces of this button were uniformly smooth; the fracture dense, and displaying a grain peculiar to highly saturated blistered steel. When put under the hammer with a low red heat, it withstood a few blows, but afterwards parted.

Charcoal  $\frac{1}{20}$ : the metallic button weighed  $\frac{1}{31\frac{6}{10}}$  less than

the iron employed. Its surface was wavy and crystallized: the under surface was rough, and contained one large pit accurately crystallized: the fracture was regularly granulated, small but distinct, and of a light blueish colour. The crystals, though distinct, were not so prominent as those of easy drawing cast-steel; it however hammered with the usual degree of caution necessary in the working of cast-steel. The bar of steel formed from the button was very proper for file-making, and other purposes requiring highly converted steel.

The proportion was reduced to  $\frac{1}{25}$ th part the weight

of iron: the produce was  $\frac{1}{22\frac{8}{10}}$  less than the original weight

of iron. The surface of the button was smooth, without crystals: the under surface rough, and possessed of one large pit in the centre, faintly marked with the usual crystalline appearance. The fracture presented regular light-blue grains, distinct and more prominent than in the last experiment. One half of this button was drawn into a neat square bar, and proved excellent steel. One end of it, being loose and shaled, welded tolerably well, and hardened afterwards with a low heat. From its quality, it seemed adapted for manufacturing penknives, razors, &c. possessing neither the extremes of hardness nor softness.

Mr. Musket continued this series of experiments till the proportion of charcoal became so small as  $\frac{1}{25}$ th part; and he gives the following conclusions, deduced from the results.

	Parts by Weight.
Iron semi-steelified is made with charcoal	$\frac{1}{15}$
Soft cast-steel, capable of welding, with	$\frac{1}{10}$
Cast-steel for common purposes, with	$\frac{1}{15}$
Cast-steel requiring more hardness, with	$\frac{1}{20}$
Steel capable of standing a few blows but quite unfit for drawing,	} $\frac{1}{20}$
The first approach to a steely granulated fracture, is from	} $\frac{1}{20}$ to $\frac{1}{15}$
White cast-iron	$\frac{1}{15}$
Mottled crude iron	$\frac{1}{10}$
Carbonated crude iron	$\frac{1}{15}$
Super-carbonated crude iron	$\frac{1}{20}$ , or

when any greater quantity is combined with it.

In the above experiments it will be seen, that when more than  $\frac{1}{20}$ th part of charcoal is employed, the weight of the produce is increased; but when less than  $\frac{1}{20}$ th part is used, a loss is experienced proportioned to the diminution of the carbon. The increase of weight in the iron is by no means equal to the loss in the charcoal, never exceeding the half thereof; but this is accounted for in other experiments made by Mr. Musket, where charcoal was found to be transmitted through close crucibles in a high degree of heat.

The French chemists made a direct experiment to prove that the diamond is really carbon in a crystallized state. By inclosing a small diamond in a piece of malleable iron, and melting this in a close crucible, it was found to be converted into steel, and the diamond had disappeared.

The manufacture of *natural steel* is carried on in Germany, and Swedenborgius gives us the following account of the method used in Dalecarlia for making steel from cast-iron.

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The ore from which the crude iron to be converted into steel is obtained, is of a good kind; it is black, friable, and composed of many small grains: it produces very tough iron. The conversion into steel is made upon a forge-hearth, something smaller than that commonly used for converting cast-iron into malleable iron: the sides and bottom are made of cast-iron; the tuire is placed with very little inclination on one of the side-plates; the breadth of the fire-place is fourteen inches, its length is greater; the lower part of the tuire is six inches and a half above the bottom: in the interior part of the fire-place, there is an oblong opening for the flowing of the superfluous scoria.

The workmen first put scoria on the bottom, then charcoal and powder of charcoal, and upon these the cast-iron, run or cut into small pieces. They cover the iron with more charcoal, and excite the fire. When the pieces of iron are of a red white, and before they begin to melt, they stop the bellows, and carry the mass under a large hammer, where they break it into pieces of three or four pounds each: the pieces are again brought to the hearth, and laid within reach of the workman, who plunges some of them into the fire and covers them with coal. The bellows are made to blow slowly till the iron is liquefied, when the fire is increased; and when the fusion has been long enough continued, the scoria is allowed to flow out, and at that time the iron hardens. The workman adds more of the piece of crude iron, which he treats in the same manner, and so on a third and fourth time, till he obtains a mass of steel of about a hundred pounds, which is generally done in about four hours. This mass is carried to the hammer, where it is forged and cut into four pieces, which are further beat into square bars four or five feet long. When the steel is thus forged, it is thrown into water, that it may be easily broken, for it is yet crude and coarse-grained. The steel is then broken in pieces, and carried to another hearth, similar to the former. These pieces are laid regularly in the fire-place, first two parallel, upon which seven or eight others are placed across; then a third row across the second in such a manner, that there is a space left between those of the same row: the whole is then covered with charcoal, and the fire is excited. In about half or three quarters of an hour the pieces are made hot enough, and are then taken from the fire one by one, to the hammer, to be forged into little bars from half a foot to two feet long, and while hot, are thrown into water to be hardened. Of these pieces, sixteen or twenty are put together, so as to make a bundle, which is heated and welded, and afterwards forged into bars four inches thick, which are then broken into pieces of convenient length for use.

*Converting of Steel by Cementation with Charcoal.*—The quality of steel is intimately connected with that of the iron from which it is converted, and the iron made in Sweden is esteemed the best for the purposes of cementation. This process is almost wholly in the hands of the English, who pay a higher price for the iron, and by that means secure nearly all the iron of Roslagia, which is the best iron of Sweden.

The best marks of Swedish iron are: that called the hoop L, which is denoted by a circle, with an L in the centre;

thus, : the G L; thus, : the double bullets;

thus, . The iron of these three marks bears nearly the same price, which is sometimes as high as 40*l.* per ton.

There are also the Swedish marks; as P L, : the hoop

S, : and the gridiron, ; which are worth a few pounds per ton less than the former; viz. from 34*l.* to 38*l.*, when the best marks are 40*l.*

The Russian marks are, first, that called the C C N D: the mark is six Russian letters, C H E H P B, worth about 37*l.* per ton, when the others are at 40*l.*: and the P S I, which is marked by the Russian letters P S I, is so inferior, as to sell for only 26*l.* or 27*l.*

It is to be lamented that, in the present state of our iron manufacture, we are unable to produce malleable iron which is equally fit for converting into steel with the Russian and Swedish iron. The general opinion upon this deficiency is, that it arises from some superiority in the foreign ores of iron, but more immediately from the circumstance of their using charcoal of wood instead of the coke of pit-coal in smelting or reviving them; and some of our manufacturers do not hesitate to assert, that they can make iron with charcoal equal to the foreign in quality; but that in respect to price, the circumstances of this country will not allow them to cope with those countries, where the destruction of wood is in some measure considered as beneficial, by clearing the land for the operations of husbandry.

The Swedish and Russian iron is imported into this country by iron merchants in immense quantities together, this trade being in the hands of a few individuals: by them it is retailed in smaller portions to the converters, whose furnaces are chiefly about Sheffield and at Newcastle, who, after cementation, dispose of the greater part of it to the manufacturers of steel goods in the state of blistered bars. Its value is estimated by the Swedish or Russian marks of iron, which still remain upon the bars. The manufacturers send their bars to the tilt-mills, where they are made into common steel and shear or German steel, or they melt it to form cast-steel.

The conversion of iron into steel is performed in a furnace, hence called a converting furnace. The external building is a large and tall cone, similar to a glass-house, within which, one or two large crucibles, called pots, are placed, and surrounded by flues in a manner best calculated to communicate a constant and regular heat to every part of them. In these pots the iron bars are placed, being stratified in pulverized charcoal, and the pots are covered over with sand to exclude the external air.

A more perfect idea of the converting furnace will be had by referring to *Plate VII. of Iron Manufacture*, which contains a horizontal plan and two vertical sections of one of the furnaces used in the neighbourhood of Sheffield, with two pots for containing the iron. In all the figures, the same letters of reference denote the same parts. C C is the external cone, built of brick or stone work; its diameter at the base varies in different furnaces, according to the size of the pots it contains: its extreme height from the ground to its vertex should not be less than forty or fifty feet to cause a proper draught. To create a sufficient heat for the process, the top of the cone usually terminates with a cylindrical chimney of some feet in height. The conical form of the external building is by no means essential; any form will operate in the same manner, if it is of a proper height: some are in practice built nearly in the shape of the small end of an egg, with a round chimney upon the top. The lower part of the cone is built square or octangular, as is the plan of *fig. 3.* The sides are carried up until they meet the cone, giving the furnace the appearance of a cone cut to a square or octangular prism at its base, and exhibiting the parabola where every side intersects the cone.

The conical building contains within it a smaller furnace, called

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called the vault, built of fire-brick or stone, which will withstand the action of a most intense heat, without cracking or vitrification. D D in the section is the dome of the vault, and E E its upright sides, the space between which, and the wall of the external building, is filled up with rubbish and sand. The vault, as is shewn in the plan, is always four-sided, that it may contain the pots which receive the iron bars to be converted. A B represent the two pots, built of fire-stone, each ten feet long, three feet deep, and two feet nine inches wide; the space between them is twelve inches wide; and directly beneath it is the fire-grate. The pots are supported by a number of detached courses of fire-brick, as shewn at *ee* (*fig. 1.*) which leave spaces between them, called flues, to conduct the flame under the pots: in the same manner, the sides of the pots are supported from the vertical walls of the vault, and from each other, by a few detached stones, (*f, fig. 1.*) placed so that they may intercept as little as possible of the heat from the contents of the pots. The adjacent sides of the pots are supported from one another by small piers of stone-work, which are also perforated, as shewn at *d* (*fig. 2.*) to give passage to the flame. The bottoms of the pots are built of a double course of brick-work, about six inches thick; the sides nearest together are built of a single course of stone, about five inches in thickness; and the other parts of the pots are single courses about three inches, the sides not requiring so much strength, because they have less heat and pressure to resist.

The vault has ten flues or short chimneys, F F, rising from it; two on each side, to carry off the smoke into the great cone, shewn in the plan 3, communicating with each side, and two at each end.

In the front of the furnace, at H, an aperture is made through the external building, and another corresponding in the wall of the vault: these openings form the door, at which a man enters the vault to put in or take out the iron: but when the furnace is lighted, these doors are closed by fire-bricks luted with fire-clay. Each pot has also small openings in its end, through which the ends of two or three of the bars are left projecting in such a manner, that by only removing one loose brick from the external building, the bars can be drawn out without disturbing the process, to examine the progress of the conversion from time to time: these are called the tap-holes; they should be placed in the centre of the pots, that a fair and equitable judgment may be formed from their result of the rest of its contents.

*ab*, in the elevation, is the fire-grate, formed of bars laid over the ash-pit I, which must have a free communication with the open air, that it may convey a current of fresh air to supply the combustion. The ash-pit should also have steps down to it, that the attendant to the furnace may get down to examine by the light, whether the fire upon the whole length of the grate is equally fierce; and if any part appear dull, he uses a long iron hook to thrust up between the bars and open a passage for the air. The fire-place is open at both ends, and has no doors. The fire-grate is laid nearly on a level with the floor of the warehouse, before the furnace, and the fireman always keeps a heap of coals piled up before the apertures at its ends, so as to close the opening. This forms a very simple and effective door; and when the furnace requires a fresh supply of fuel, a portion of the heap of coals is shoved in by a sort of hoe, and the heap renewed, to stop any air from entering into the furnace, except that which has passed upwards through the ignited fuel, and by that means contributed to the combustion.

The fire-stones that compose all those parts of the furnace which are exposed to the action of the heat, are first hewn nearly to size, and finished by grinding two surfaces together, so that they make very perfect and close joints:

when laid together, they are cemented with well-tempered fire-clay, mixed up very thin with water. The fire-clay which answers best for this purpose, is that brought from Stourbridge, in Staffordshire, and is the same of which the celebrated Stourbridge crucibles are composed; but very good fire-clay for the purpose is procured from Birkin-lane, near Chesterfield. When the furnace has been once burnt, this clay becomes equally hard with the stone, and is less liable to fly or vitrify in an intense heat, than any other known cement.

The process of charging the furnace with iron for conversion is conducted as follows. The bars of iron are first cut to the length of the pot; and for this purpose an anvil is placed at such a distance from the wall of the building, that the distance from the edge of a cold chisel wedged into the eye of the anvil, to the wall, will be just the length of the pots. One workman places the end of a bar against the wall, and lays the other end across the edge of the chisel, whilst another with a sledge-hammer strikes upon the bar till it is cut half through; then it is turned the other side upwards, and the end cut completely off. By this gauge the bars are all cut to one length, and a man enters through the door in the vault, to dispose of them in the pots: he is provided with a basket of fine pulverized charcoal, a sieve, and a shovel. An iron plate is put into the furnace, and lays over the space between the two pots to form the floor, upon which the man stands while at work. He commences his operations by sifting a layer of charcoal over the bottom of the pot, about half an inch thick, and he is careful in using the sieve to lay the charcoal of an even thickness in every part; but if it should not be carefully done, he levels it with the shovel. The workman on the outside now introduces the bars into the furnace through a hole, made by taking out a brick in the wall, just over the end of one of the pots, and the workman within deposits them upon the stratum of charcoal in the bottom of the pot, arranging them parallel to each other, and leaving an interval of about an inch between each bar. When the bottom of the pot is in this manner covered with iron bars, charcoal is again sifted upon them, and levelled with the shovel, to fill up the intermediate spaces between the bars, and to cover them about an inch thick: another layer of bars is then introduced into the furnace, placed upon the charcoal, and in its turn covered over with a stratum of charcoal; and in this manner the pot is filled to within two inches of the top. A layer of the sand which is found in the bottom of grindstone troughs, is then spread three or four inches thick upon the whole, to cover the pots up close, and prevent the access of the common air and flame. In placing the successive layers of bars in the pot, it is proper that each should be laid over the space between two of the bars in the layer beneath, because each bar will then be surrounded by a greater thickness of charcoal, than it would if they were laid directly over each other. Two or three of the bars should be left somewhat longer than the rest, and their ends should project through the trial-holes in the ends of the pots, and sand rammed round them in the holes to keep out the air.

The pots being both filled and covered up with the sand and rammed down, the holes for introducing the bars are closed by a brick or fire-stone, and luted with fire-clay. The apertures through the outer wall opposite the ends of the trial-holes are also stopped and luted. The iron plate upon which the man stood is now removed, and the doors in the vault closed up by bricks set with fire-clay; next, the opening in the external building is shut up, and the furnace is charged ready for lighting.

The furnace is kindled by lighted wood placed on the fire-grate, then a few coals are thrown in, and when well lighted, the quantity is increased; the heat thus generated rarefies the air contained in the vault and in the great cone;

and

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and being thus rendered of less specific gravity than the external air, it rises up in the cone, and a fresh supply rushes in through the bars of the grate, to restore the equilibrium. By going through the fire, this air parts with its oxygen, and excites the combustion, and becoming heated, rises up the chimney, and causes a very strong draught of air to enter the fire.

At first kindling, the fuel is supplied in small quantities, that the heat in the furnace may be gradually increased, and not endanger the cracking of the stones: in a few hours time the quantity of fuel is increased, so as to produce the full heat, which is to be maintained as equally as possible throughout the whole process. The fuel, which is pit-coal, is introduced at both ends of the grate, through small arches in the wall, which are in a line and on a level with the fire-grate, a quantity of coals being always left before the end of the arch to stop it up, and prevent any air getting into the furnace, without passing through the grate. Part of these coals is forced into the furnace, as before mentioned, when it requires a supply of fuel, which is generally at intervals of about half an hour each. The fireman frequently examines the appearance of the under side of the fire-grate, and judges from it the state of the fire: he improves it where necessary, as before described, by thrusting a hook up between the bars to make way for the air.

The flame arising from the ignited fuel upon the grate partly proceeds upwards between the pots, and heats them by that means; it then strikes the roof of the vault, and is reverberated down upon the pots, and escapes through the six flues or chimnies in the vault. The draught also draws the flame from the grate under the pots, and round the outside and ends. The principal object in this stage of the process, is to maintain the same degree of heat in every part of the pot, that every bar may be equally converted in the same space of time. The roof of the vault must be built of very good stone (none being better than from Roches quarry, in Ashover), to withstand the great heat exerted upon it: it is customary to build them very thin, and cover the outside with a small thickness of dry sand to keep them tight, in case of a stone cracking.

In this way the fire is kept up in as equable a manner as possible, until the iron is supposed to have imbibed a sufficient portion of carbon from the charcoal to render it fit for its intended purpose: in this circumstance, the manufacturer regulates his judgment by his experience of former processes. About the time that he supposes the conversion to be sufficiently advanced, one of the trial-bars is drawn out from the pot, and by comparing the size of the blisters raised upon its surface with another bar which is known to be sufficiently carbonated, an idea is formed of the state of the furnace, and accordingly the fire is, at the proper time, discontinued, and the furnace is suffered to cool. Some manufacturers proceed to make experiment of the trial-bar by hardening and tempering it, so as to prove to a certainty the degree of its conversion, the blisters being found in some degree fallacious; for their size depends as much upon the degree of heat to which the bar has been exposed, as upon its carbonization, and shew the rapidity with which the conversion has been carried on, rather than its actual state.

The time which the iron is required to be in the process of cementation depends upon a variety of concurring circumstances. 1. The degree of carbonization required to form a steel of the proper quality; this varies with the use the steel is to be applied to. 2. The heat it is subjected to. 3. The nature of the iron employed in the process. The combinations of these circumstances are so numerous, that nothing but long experience can determine the proper duration of the process.

In general terms it may be observed, that a short period will produce a steel very soft and tenacious, which, when properly treated, will possess elasticity as its most striking property, and is therefore very proper for springs, wire-drawing, and other purposes requiring ductility, but without the hardness requisite for edge-tools. The period of cementation for such steel varies in different manufactories, from four to six days and nights.

Steel which requires more hardness, but at the same time sufficient tenacity to resist sudden shocks, such as the edge-tools for working wood are subject to, must be cemented a longer time. This, which is mostly tilted into shear steel, is cemented six, seven, or eight days, according to the heat and the quality of iron employed. The steel employed for fabricating tools for cutting metals and hard substances being but small in demand compared with the others, is not cemented a longer time, but is returned into the furnace at the next charge, along with a charge of iron, and cemented again with fresh charcoal: this is termed double converted steel. But for some few purposes, such as the turning and boring of cast-iron, the steel is converted three times: in this state it becomes so hard and brittle as to be totally unfit for any purpose requiring tenacity, or for any cutting edge which is less than an angle of 70 degrees, or it would be continually breaking.

The heat which is requisite for the process, must be as great as to give the iron nearly a welding heat, but if carried farther, will endanger melting the bars when the process has proceeded some time; an accident which has frequently occurred through the inattention of the fireman. It is observed by manufacturers, that the carbonization proceeds quicker when the heat is greatest, and for this reason the duration of the process varies in different furnaces, in some measure from their construction, in urging a greater heat, and this depends chiefly upon the height of the chimney, and the draught it occasions.

When the conversion is supposed to be complete, the furnace is suffered to cool, until a man can conveniently enter the furnace, to take out the bars and remaining charcoal, and prepare the furnace for a new charge. The bars which are brought out are (from being covered with blisters upon the surface) termed blistered steel.

On examination of the fracture of a blistered bar, it is found full of internal cracks, which are generally parallel to the flat side of the bar: some of them are larger than others, and extend the parts of the bar sufficiently to raise numerous protuberances or blisters upon its surface. These cracks have every appearance of being opened by the expansive force of some gas generated in the iron during the process, but what the nature of this gas is, still remains to be investigated. It seems to arise from the body of the iron itself, by the crack being within the solid substance of the bar. The fracture of the blistered steel is exceedingly irregular, of a white colour, like frosted silver, and appears like an irregular crystallization; but the facets exhibited are larger in proportion as the cementation has been longer continued, and from this reason they are larger towards the surface of the bar than in its centre.

The furnace above described is of that kind which is esteemed the best for the process, and is most generally employed in and about the neighbourhood of Sheffield in Yorkshire, where the manufacture of steel is carried on in a larger scale than in any other part of England. The furnaces used at Newcastle, which is another seat of this trade, are very similar.

The charge consists of twelve tons, each pot containing six tons of iron; and it is necessary that all the bars converted

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at one process be of the same size, or the smaller ones would be thoroughly converted before the others had taken up a sufficient dose of carbon. This large quantity of a single article is more than the trade of some manufacturers will dispose of, they therefore employ smaller furnaces, which contain only eight tons, and such are generally constructed but with one pot ten feet in length, three feet broad, and two feet deep: the fire-place is directly beneath the pot, twenty inches wide, and flues are carried round it on both sides and ends: the vault and chimney of such a furnace are the same as the double pot. It is found by experience that the small furnaces consume somewhat more fuel in proportion to the quantity of iron they convert, than the large ones, because the heat lost in the beginning and end of the process, and that transmitted through the walls of the building, is the same in both instances.

Mr. Daniel Little of America, in 1785, recommended a new substance to be used in the cementation of steel instead of charcoal: it is the marine plant known by the name of rock-ware, or rock-ware, and is found in great plenty on rocky shores in America. It was to be prepared by first mowing it from the rocks by the scythe or sickle, and spreading it out on dry land till the rains have washed off the greater part of the sea-salt; it was then to be dried and pulverized, and may be used as any other cement for making of steel. He says that he discovered this property in an experiment where a small piece of iron was put into a crucible, and filled with the powdered plant as a cement: after it had been exposed to little more than a cherry heat for five or six hours, it was converted into steel.

All cemented steel in its raw state, after it is taken from the converting furnace, is called blistered steel; because the surfaces of the bars are covered with blisters, and on breaking a bar it is found to be full of cavities within, which seem to have been opened by some gas generated in the iron when in the process of cementation, and to have raised the surface into blisters, which are hollow within. In this state the steel is not fit for any purpose, because of these numerous cavities, and from the great disposition it has to break with the most irregular and rugged fracture imaginable. To render it found and tenacious, it must be well hammered while at a moderate heat, which operation is termed *tilting the steel*, because it is done under the tilt-hammer, worked by machinery. There are many reasons why the hammering of steel cannot be sufficiently performed by hand: the principal are, that the expence of labour would be too great to answer, and that a man could not strike hard and quick enough, to complete the operation at one heat of the steel: if more than one heat is taken, the steel will not receive so much advantage from the hammering, because when it is heated, its pores are opened; and if suffered to cool without hammering, the grain of the steel will be found considerably coarser; therefore, every time it is heated, the good effects of the previous hammering are in a great measure lost. Tilt-hammers are worked by water-wheels or steam-engines, according to the local situation of the manufactory. (See a description in the article *TILT-Hammer*, Plate VIII. *Iron Manufacture*.) The same axis is made to actuate three or four tilt-hammers placed side by side, and the hammers are not all of equal lengths, each one being shorter than the next: by this arrangement, when they are all working together, the workman of one tilt does not incommode those employed at the other two. The anvils of the hammers are nearly on a level, or at most only a few inches above the surface of the ground; and the workman sits in a pit or fosse, dug for the purpose, in a direction perpendicular to the helve of the tilt, upon a seat which is suspended from the roof of the building by two

iron rods: by this means he can with the greatest ease advance to or from the hammer, by just touching the ground with his foot, and pushing himself backwards or forwards as he sits in the swing. The three seats are in parallel directions, but sufficiently distant from each other, in consequence of the different lengths of the hammers, to allow the workmen to perform their business. At a convenient distance from each tilt, is placed the forge for heating the steel. The two forges for the small hammers are placed together under the same dome, while the other forge is by itself near the great hammer. The bellows for the forges are worked by a small crank on the end of the gudgeon of the shaft; they are placed over-head in the roof of the building, and a copper pipe conveys the air to the tue iron. The forges are like those used by smiths, except that they have a small cover built of fire-brick over the hearth: the cover is square within, about eight inches wide, eight high, and eighteen inches or two feet long. It is open in front, to introduce the bars. The coals are placed on the hearth, as smiths usually do, and the brick cover acts, to reverberate the flame down upon the steel, and give a very regular heat. Each workman at the tilt is attended by two boys, who heat the steel at the forge, and convey it to the workman, that he may lose no time: another boy attends each tilt to take away the finished rods and cut them to length, and then to straighten them.

The operations of the tilt are conducted in the following manner: Suppose a piece of steel has been heated by one of the boys, and brought to the man at the hammer, he places it upon the anvil, at a part nearest to the centre of the hammer, where its surface is reduced to a round edge, about an inch wide: the face of the hammer is made round, to correspond with the anvil, and from its similarity to the edge of a smith's hammer, may be called the pen of the hammer and anvil. The machine is always in rapid motion, and between every stroke that the hammer makes, he moves the bar forwards on the anvil, that it may be struck by the edge of the hammer in a fresh place. If the bar is flat, as blistered steel usually is, it is first hammered in this manner upon its edge, to reduce it to a square, and at the same time draw it out in length. When it has been hammered thus all its length, the surface becomes indented on both sides by the edges of the hammer, the anvil being bounded by waving lines. This first operation is called *notching down*. The tilter then removes the bar beneath the flat face of the hammer, and the rod is flattened at every stroke, and all the indentation removed; when he gradually recedes from the hammer, drawing the rod along, and flattening it all the way. When the end of the rod comes under the hammer, he turns the other face of the rod upwards, and advancing to the hammer, pushes the rod forwards under it: in this manner he proceeds, flattening it on one side or the other, until he brings it to the proper size, which he tries by a gauge. The moment it is finished, the boy brings another piece of hot steel, which he places under the hammer, and then the other boy takes away the finished rod from the tilter, who takes the fresh piece: in doing this, they are careful that the hot piece of steel is placed under the hammer before the other is taken away, that the faces of the hammer and anvil may not strike together, when there would be danger of breaking them, as they are both made of cast-iron: the second piece is tilted in the same manner as before, and when finished, is changed for another.

The perfection of tilting steel, depends upon drawing out a rod perfectly straight to the same size in every part of its length. Many workmen, particularly at Sheffield, have acquired such skill and dexterity in the management of the rod while under the tilt, that their work is as straight and even

as though it had been drawn through a steel-plate, in the same manner as wire, and all its angles perfectly square: its surface is of a black polish, and as smooth as though it had been filed. All artists use the square steel rods for making their tools; and the straightness and regularity of the rods are such, that a person who has not been an eye-witness of the operation, would scarcely believe it possible to produce such accurate work from the blows of a hammer. The points to be attended to by a tilter are, that in notching down the bar to draw it out to length and size, he causes the blows to fall exactly at equal distances from each other, unless (which seldom happens) the bar should have any part thicker than the rest; the strokes must then be a little nearer together in that place, to reduce it all to one size. Afterwards, to flatten the bar, he must be careful to place the bar truly flat upon the anvil, and hold it in the same place, whilst he draws the bar under the hammer, and that he moves himself with a perfectly equable motion, that every part of the bar may be alike subjected to the action of the hammer: the surface will then be true, and free from undulations. Another circumstance to be attended to is, when he turns the bar upon the anvil to hammer the adjacent sides, that he makes them truly square to the former sides. These things must all be done in so little time, that it requires long practice and experience to perform them well. Beginners are always apt, when they place their feet on the ground, to move themselves too quick just at that time, which causes the bar to be thicker at that place.

The different methods of conducting the operation of tilting, give the steel different qualities, which are distinguished into 1. Common steel; 2. Shear or Newcastle steel, also called German steel; and 3. Tilted cast steel.

*Common steel* is made by tilting bars of blistered steel, and drawing them out into rods of any size. The blistered bars are of various sizes, but in general about an inch and a half broad by half an inch thick. If these are to be drawn into rods half an inch square, they are broken into convenient lengths to handle, and one end of each piece is heated to a good welding heat by the boy who attends the forge, who puts three or four in the fire together, and, according to their size, he learns by experience at what time he must put every one into the fire, that it may acquire the proper degree of heat by the time that the tilter shall have just finished the other bars.

The tilter first begins by notching down the narrow edge of the bar, holding the other end of it in his hand, and notches down such a length of it as experience teaches him will be sufficient to form a rod of the length and size required. The notching on the edge of the bar rather increases its thickness, while it diminishes its breadth, and brings it nearly to the square figure of a rod: he then flattens it, and begins again to notch it down upon the broad side; afterwards he again flattens it; then proceeds to notch it upon the edge, and afterwards to flatten it once or twice on both sides, and the rod is finished.

When a skilful tilter has been some hours at work upon rods of one size, he judges by sight when the rod is of the proper size; but on first beginning, he tries it by a gauge, and flattens it repeatedly, if necessary, the boy bringing a piece of hot steel to place under the hammer while he is gauging, and which is drawn out in its turn. When the tilting is completely finished, the steel rod is taken away by another boy, who, with a pair of shears, cuts off the rod from the blistered bar from which it was drawn out. He places the rod on a flat cast-iron table, and sets it truly straight by a hammer, then stamps the bar with a mark of the quality of the steel, and it is finished.

All these operations are performed in so short a time, that

the rod still retains a red heat; but this will excite less surprize when it is considered that the hammer strikes four hundred blows *per minute*, and falls with great weight, so that it soon completes the work, and it is very probable that the great percussion it exerts upon the steel in some measure preserves the heat. It is well known that blacksmiths are in the constant habit of lighting a match to kindle their fire, by only hammering a small piece of iron quickly, and turning it about under the hammer, and in a short time it acquires sufficient heat to inflame the sulphur of the match. This heat most probably arises from the friction which the hammer causes amongst the particles of the iron, by rubbing them violently against one another; and the smiths observe, that the iron will not become red-hot if it is always struck upon the same side; but it must be turned round, that a new surface may be continually exposed to the action of the hammer.

*Shear steel* is so called, because the shears for dressing woollen cloth are made of it. It is also called Newcastle steel, because formerly made there; and German steel, because the natural steel in Germany is treated in the same way; it is likewise called *faggotted steel*. To make shear steel, the bars of blistered steel are broken into lengths of about eighteen inches; then four or more of these are laid together with one of double the length, and all four are tied together with pieces of small steel: this is called a faggot, and is placed in the forge, to be heated to a good welding heat; it is then taken to the tilt, and notched down on both sides, to weld all the bars together, and close up the internal flaws. The workman holds the faggot by the end of the long bar as a handle: the operation of welding takes but a few seconds, and a small rod is then drawn out from a piece of the end, in the same manner as drawing out common steel.

*Cast steel* is prepared by melting fragments of blistered steel, and casting them into an ingot. (See STEEL.) The ingot is then drawn out under the tilt into the required size, and the manner of doing this is the same as for common steel.

It is the custom of the manufacturers of cutlery and steel goods to purchase steel from the converting furnaces in the state of blistered bars, which they send to the tilt-mills to be drawn out to the size they require for their use: this is done at regular prices. In tilting steel, a trifling loss is sustained by the metal oxydating upon the surface, and throwing off black scales. The manufacturers are in the habit of allowing 4.6 to 8 lbs. *per* hundred weight for such loss: this latitude is given, because in drawing the bars out into rods of a small size, the waste must necessarily be greater; the metal being much longer exposed to oxydation, and the surface throwing off more scales.

TILUTHA, in *Ancient Geography*, an island of Asia, in the Euphrates, about 33° 55' lat.

TILWARAH, in *Geography*, a town of Hindoostan, in Gurry Mundella; 5 miles S. of Gurrab.

TIM, a town of Russia, in the government of Kursk; 44 miles E. of Kursk. N. lat. 51° 40'. E. long. 37° 34'.

TIMA, THIMA, *Taima*, *Abalao*, or *Al Ablak*, a town of Arabia, in the province of Nedsjed; 180 miles N.N.E. of Medina.

TIMACUM, in *Ancient Geography*, a town placed by Ptolemy in Upper Mæsia, at a distance from the Danube.

TIMÆA, a town of Asia, in the interior of Bithynia. Ptol.

TIMÆUS, the *Locrian*, in *Biography*, was a philosopher of the Italic school, and flourished in the time of Plato, who derived from him principally the doctrine of Pythagoras, and whose book, entitled "*Timæus*," was

founded on his book "On the Nature of Things." Proclus preserved a small treatise of Timæus "On the Soul of the World," and it is prefixed to some editions of Plato's Timæus. In this treatise, chiefly Pythagorean, he differs from Pythagoras in the following particulars: *viz.* that, instead of one whole, or monad, he supposes two independent causes of nature, God and Mind, the source of intelligent nature, and Necessity or Matter, the original of bodies; and that he explains the cause of the formation of the world, from the external action of God upon matter, after the pattern or ideas existing in his own mind. Upon a comparison of this piece with Plato's Timæus, it will be found that the Athenian philosopher has obscured the simple doctrine of the Locrian with fancies drawn from his own imagination, or from the Egyptian schools.

In the time of Ptolemy Philadelphus there was a Sicilian, named Timæus, who was a celebrated historian; but none of his writings are extant. He died at the age of 96, B.C. 262. Brucker, in *Enfield*, vol. i.

TIMAGENUS, in *Ancient Geography*, an island in the Arabic gulf. Ptol.

TIMANA, in *Geography*, a town of South America, in the province of Popayan; 80 miles E. of Popayan. N. lat. 2° 12'. E. long. 74° 46'.

TIMANTHES, in *Biography*, a famous Grecian painter, was, as it is said, a native of Cythnos, one of the islands called Cyclades, or of Sicyon, and flourished about the year B.C. 400. The mind of this artist is supposed to have surpassed his art, in the exercise of which he displayed great skill, so that in his performances, something was to be understood, which he did not express. As an instance of this, we are referred to his picture of Iphigenia about to be sacrificed, in which, having exhausted every variety of the expression of grief in the other spectators, he has thrown a veil over the face of her father, thus intimating that his anguish surpassed all external tokens. In his Sleeping Cyclops, exhibited in a small tablet, he has introduced Satyrs measuring his thumb with a thyrsus, in order to give an idea of the magnitude of the principal figure. At Samos he was a competitor with the famous Parrhasius in a piece, of which the subject was the judgment for the arms of Achilles, between Ajax and Ulysses; on this occasion the prize was awarded to Timanthes. In the temple of Peace at Rome a hero of admirable workmanship by the same artist was preserved. Pliny Nat. Hist.

TIMAR, a tract or portion of land, which the grand signior grants to a person on condition of serving him in war, on horseback.

Some define the timar a portion of land assigned to a spahi, or other person fit to serve on horseback, to enjoy, during life, for his subsistence.

Meninski describes it as a stipend or revenue, granted to old soldiers who have deserved well, in lands, and possessions of castles, towns, villages, fields, or in tithes, and other fruits and incomes; sometimes with the prefecture, jurisdiction, or signory of the said places.

The timar is a kind of fief granted for life. The whole Ottoman empire is divided into saugjaekies, or banneries, under which all such as hold timars, who are called *timariots*, are bound to list themselves when summoned upon any expedition. Timars may be resigned as benefices among us, only obtaining the consent of the beglerbey, or governor of the province. Indeed, for timars of above 2000 aspers *per annum*, called *zaim*, the grand vizier alone grants dispensations.

TIMARIOTS, those who enjoy lands on the footing and tenure of timars. See TIMAR.

The timariots are obliged to serve in war, personally, with as many men and horses for service as their timar, by the estimate made of it, contains 2500 aspers, or about 6*l.* sterling; and to maintain them constantly mounted and armed after their manner, to be ready to march at all hours when commanded, and that on pain of death; nothing, not even sickness itself, being allowed to excuse them.

Besides this service, they likewise pay an acknowledgment of one-tenth of their revenue. If they have any children of age to bear arms, and fit for the service after their decease, or, in defect of this, if they have any relations that have the least interest, the timar is used to be continued to them on the same conditions, otherwise it is transferred to others.

If the revenue thus held of the grand signior exceed 15,000 aspers, or 36*l.* sterling, they who hold it are not called *timariots*, but *subassi*, or *zaims*: these always have the administration of justice in the place, under the sargiac of the province.

The timariots have different appointments, from 4000 or 5000 aspers, equal to about 12*l.* sterling, to 20,000 aspers: but unless their timar exceed 8000 aspers, they are never obliged to march, except when the grand signior goes to the army in person, on which occasion none are exempted.

The origin of the timariots is referred to the first sultans, who, being masters of the fiefs or lands of the empire, erected them into baronies or commanderies, to reward the services of their bravest soldiers; and especially to raise and keep on foot a number of troops without disburfing any money.

But it was Solyman II. that first established the order and discipline among these barons, or knights of the empire; and by his order it was, that the number of horsemen each should maintain was regulated.

This body has heretofore been not only exceedingly powerful, but great and illustrious throughout all the empire; but avarice, the ordinary fault of the Orientals, has occasioned their declension of late years.

The viceroys and governors of provinces manage their matters so at court, that timars, even out of their jurisdiction, are given to their domestics, or to such as will give them the most money for them.

There are two kinds of timariots, the one appointed by the Porte, the other by the viceroy of the country; but the revenues of both are less than those of the zaims, and their equipage and tents less in proportion.

Those who have their patents from the court, have from 5000 or 6000 aspers to 19,999 aspers *per annum*; if they have one asper more, they become zaims. Those who receive their patents from the viceroys, have from 3000 to 6000 aspers *per annum*.

This cavalry is better disciplined than that properly called the *spahis*, though the spahis be the neatest and briskest. These last only fight in platoons; whereas the zaims and timariots are divided into regiments, and commanded by colonels, under the direction of bashaws. The bashaw of Aleppo, when in the army, is colonel-general of this militia.

TIMARISTAN, in *Geography*, a town of Persia, in the province of Farsistan; 15 miles E. of Pasa.

TIMAVO, a river of Carniola, which runs into the gulf of Trieste, near Duino.

TIMAVUS, in *Ancient Geography*, a fountain, lake, river, and port of Venetia.

TIMBANG, in *Commerce*, a measure at Batavia for rice, pepper,

pepper, and other dry goods. It is reckoned at ten sacks, or five pikuls: another measure is called kulack, and weighs  $7\frac{1}{4}$  catts: 7 kulacks make one timbang, liquid measure.

TIMBER, in *Geography*, a river of Prussian Lithuania, which runs into the Nemouin; 4 miles N.E. of Wipe.—Also, a town of Prussian Lithuania, 6 miles W. of Insterburg.

TIMBER, or *Timber-Trees*, in *Rural Economy*, that sort of wood produce which is useful and proper for the purposes of building, the construction of tools, implements, carriages, &c.; or such large trees of different sorts as have reached their full or suitable states of growth, and are in situations fit for being cut down for use. The various kinds of trees which are the most useful and important in this intention, have been noticed and considered in speaking of the nature of common and other plantations and planting; but they are chiefly the different sorts of pines, the larch, the birch, the common ash, the mountain-ash, the beech, the sycamore, the elm, the oak, the horse and common chestnuts, the alder, and the poplar. However, in general, the oak, the ash, the elm, the larch, and the Scotch pine, are by much the most useful and valuable for all the different uses of this nature.

We shall here mention from Evelyn's *Sylva*, &c. some of those kinds of timber that are most serviceable, and give a brief view of the uses to which they are applied, referring to their several denominations and other collateral articles for a further detail.

1. *Oak*, the uses of which need no enumeration; to endure all seasons and weathers, there is no wood like it: hence its use in pales, shingles, posts, rails, boards, &c. For water-works, it is second to none; and where it lies exposed both to air and water, there is none equal to it.

2. *Elm*: this, felled between November and February, is all spine or heart, and no sap; and is of singular use in places where it either is always wet, or always dry: its toughness likewise makes it of use to wheelwrights, millwrights, &c.; nor must it be omitted, that its not being liable to break and fly in chips, makes it fit for dressers and planks to chop on.

3. *Beech*: its chief use is in turnery, joinery, upholstery, and the like, as being of a clean, white, fine grain, not apt to bend nor split; it has been sometimes, especially of late, used for building-timber, and if it lie constantly wet, is judged to outlast oak.

4. *Ash*: its use is almost universal; it is good for building, or other occasions where it may lie dry: it serves the carpenter, cooper, turner, ploughwright, wheelwright, gardener; as also it is used at sea for oars, handspikes, &c.

5. *Fir*, commonly known by the name of *deal*, is of late much used in building, especially within doors, for stairs, floors, wainscot, and most works of ornament.

6. *Walnut-tree*: this is of universal use, excepting for the outsides of buildings; none is better for the joiner's use, it being of a more curious brown colour than beech, and less subject to worms.

7. *Chestnut-tree*, next to oak, is the timber most sought for by joiners and carpenters. It is very lasting.

8. *Service-tree*, used in joinery, as being of a delicate grain, and fit for curiosities: it also yields beams of considerable size, proper for building.

9. *Poplar*, *abel*: this and *aspen*, differing very little from one another, are much used of late instead of fir: they look as well, and are tougher and harder.

10. *Alder*, much used for sewers or pipes to convey water: when kept always wet, it grows hard like a stone;

but where sometimes wet, and sometimes dry, it rots presently.

The uses of timber are so many, and so great, that the procuring of a sufficient supply of it extremely well deserves the care of every state; as it must be a great disadvantage to it to be obliged to have recourse to its neighbours, and purchase, at a very considerable and continually renewed expence, what might, by an easy economy, be sufficiently supplied at home.

This economy, however, must be applied in time; for our natural indolence, our love to reap the advantages of every thing ourselves, and our little care for posterity, give great room to fear succeeding ages will want wood, both for private and public exigencies. All our arts should be employed on this subject, with two views, the one to preserve and cherish our growing wood, the other to renew the trees which have been, and are continually cut down.

The quantity of acorns which the oak bears, has made many people suppose, that Nature has taken care for a renewal for us; and that of this vast quantity of seed, which annually fall, there will be always an over-sufficient supply of young trees, which will grow up in the place of the old ones: but experience proves, that this is by no means the case. The greater number of these fallen acorns is devoured by many different animals, for whose nourishment Nature has provided that abundance of them: and of those which escape this fate, we are to consider how few can come to good, from the natural accidents they are unavoidably exposed to; they fall on a covered ground, where dead leaves, and decayed parts of branches of trees, usually prevent their touching the earth, into which they are to shoot; or, if they can shoot here, it is merely from the surface, where they are, in their slow growth, liable, while very tender, to all the inclemencies of frosts; and add to this, that it is very difficult for such tender plants as the young seedlings of these to find room for growth or nourishment among the every-way spreading roots of other trees; and the continual shade and want of free air, must render them very weakly and irregular in their growth, even supposing them to get over all the other difficulties.

It is very certain, that timber-trees of oak are frequently met with among the underwood of forests; but we shall always find this to be the case, not in the close places, but in certain spots, where there has been a vacancy or opening; and that usually, where there are not, nor have at any time been, oaks in the neighbourhood of the spot. The acorns that fall from the oaks usually come to nothing from the before-mentioned accidents; and these trees which grow at distances, are owing to the acorns brought thither by birds, and accidentally dropped there. This is an instance familiarly verified, by observing, that there are frequently little bushes near woods, which, though of white-thorn or other trees, are usually surrounded and ornamented with young oaks; the jays and the like granivorous birds are the authors of this crop; for bringing the acorns from the adjoining woods, to eat under these bushes, they drop many by the way, which they do not trouble themselves to look for on the ground, and which having here a freer ground to strike root into, and an open air to grow in, seldom fail of coming to good, unless destroyed when young.

In order to the preservation of our growing timber-trees, it would be a very useful law, that all who cut down any number of oaks, should also leave a number in good condition for after-cutting; and that no timber should be cut down, but at a proper age, in regard to the nature of the soil;

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soil; since it is certain, that trees grow to their perfection at very different periods of time, in proportion to the depth of soil they have to grow in; and that as it is, on the one hand, not for the interest of the state to suffer trees to be cut till at their perfection for size and soundness, so after they are arrived at their perfection, it is equally certain that they gradually decay.

The quality of the soil the tree stands in may be necessary to be observed to this purpose; but the quantity or depth of it is the great subject of enquiry; and a great number of observations has proved, that the proper season for cutting oaks, in a soil of two feet and a half deep, is at fifty years old; those which stand in a soil of three feet and a half deep, should not be cut down before seventy years; and those which stand in a soil of four feet and a half deep, or more than that, will increase in goodness and in size till they are a hundred years old; and observation has proved, that after these several periods, the trees begin to decay.

This seems the best rule to establish, in regard to the common soils; but those which grow in a lighter or more sandy soil, may have their periods changed from these to forty, to sixty, and to eighty years at the greatest depth; and after these times it is always best to fell the wood meant for public service, whether then wanted or not, since it is much better to keep it in public magazines, than to leave it to be daily decaying.

Heaths, and other uncultivated places, where there is no regular growth of wood, but where fern and useless plants alone seem to flourish, usually afford also some straggling trees of the oak. These probably have had their origin from acorns dropped by birds; but they seldom grow tall or regular; since, not having been defended from the injuries of cattle, they are usually browsed on, and stunted while young, and so become crooked and short-trunked, or pollard-trees. These, though not of such value as the more regular oaks, yet deserve care, both with respect to their preservation and felling; since they afford a number of trees naturally bent, and formed for many parts of ship-building.

The little care usually taken of these trees, though on this occasion of great value, seems to threaten a general loss of them; but as trees, thus naturally crooked and bent, are of value, it is a laudable attempt to try at the finding of a regular method of producing such; and this is easily practicable, by following the same methods by which these wild ones become so. They wholly owe their figure to the cattle's biting off their tops while young, and afterwards biting off again the tops of the shoots from the first wound. In this manner, if a number of young trees, set apart for the experiment, have their tops cut off at two, four, six, eight, ten, and twelve feet from the ground, and four years afterwards the shoots from these stunted tops are again cut in the same manner, the trees will be found afterwards to grow up in all the irregularly crooked figures that can be conceived, and by this means a supply of naturally crooked wood may be raised for all the occasions of ship-building, with infinitely greater ease, and more certainty, than by the method proposed by some, of bending them down with weights tied to their tops while young. See *Growth of Crooked Timber*.

As to the supply of young wood in the place of what is cut down, there are some circumstances which have not had the attention paid to them which they deserve. The spring frosts, which come on at a time when the shoots, by which nature is to raise the supply for what is cut down, are just

preparing to grow, are of prodigious injury, and do not less mischief to these than to the young shoots of garden plants, though the distant hope of the succession of the proprietor, and usually also the distance of the place, and want of repeated observations, occasion its not being perceived. This, however, may in a great measure be guarded against. Frequent experiments and repeated observations prove, that the mischief done by these frosts affect in a much greater degree those shoots which are exposed to the south, than those which face the north: and that it is greatly more powerful against such as are wholly exposed to the wind, than against such as are sheltered. These known circumstances may give the hint to a method of saving, at least, a great part of the wood to be felled from this destruction, to its renewal, by the making it a rule to begin cutting down on the north side; and, as the whole felling is a work of some years, the standing wood of every season will defend the young shoots of the newly-cut stumps the following spring, not only from the south exposure, but will shelter them also from the wind.

Many prudent managers have made fine estates of their coppice-woods, by regularly felling a certain portion every year, and providing for a renewal of the first cutting, against the felling of the last portion, by proportioning the time of growth to the quantity to be cut every year; and there is great interest to be made of a true knowledge of the growth of wood in this manner. Whoever observes the growth of young trees, will find that the second year's growth is much more considerable than that of the first; the third year is more than that of the second, and so on for many years; the yearly growths of young wood greatly increasing every season up to a certain time or age of the tree, after which the increase in bulk, by growth, becomes gradually less. The great advantage to be made of coppice-wood, would be by knowing this interesting period, and seizing on it, always to cut down the trees just at that time when they arrived at the end of their quick growth, and so setting nature to work with new shoots, to employ the same on enriching again the owner. Regular observation and experiment alone can ascertain this happy period; but any man who has much coppice-wood upon his estate, may assure himself of it, by cutting a given quantity every year, for ten years successively, and then carefully reviewing the differences of the yearly produce. *Memoirs Acad. Scienc. Ann. 1739.*

On the business of raising and growing good timber, or trees of that sort, Mr. Loudon has thrown out some interesting, ingenious, and philosophical hints and suggestions, as well as stated some strong facts in confirmation of them, in his work on forming and improving country residences. It is considered as remarkable, that the matter has never particularly engaged the attention of those who have been employed in describing the methods of rearing trees. The effects of culture on other vegetables is so great, it is said, as always to change their appearance, and not unfrequently to alter, in a considerable degree, their nature. The common culinary vegetables, and cultivated grasses, assume so different an appearance in our fields and gardens from what they do in a state of wild nature, that even a person accustomed to the nature of plants might easily be deceived in regard to the species or kind. The same general laws operate upon the whole kingdom of vegetables; and thence it is thought plain, that the effects of culture upon trees, though different in degree, must be analogous in their nature. It is true, it is said, that as yet we are possessed of no great number of either experiments or observations, to enable us to determine with minute accuracy the precise extent

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of these effects; but still a person practically conversant with the subject, who shall pay attention to what he may notice to be taking place in different parts of the country, and who possesses a sufficient knowledge of the vegetable kingdom and physiology to reason from analogy, may, it is thought, deduce such general consequences, as will suggest important practical rules and regulations.

It may be proper, it is said, to remark, that by culture is not meant merely the operations upon the soil, or on even the form of the particular tree; but every thing that tends to remove it from its natural state in order to accelerate vegetation. It is considered too, that a tree is in a natural *state* whenever it has sprung up fortuitously, and propagates itself without aid from man: whether it be in crowded forests, woody wastes, or in scattered groups on hills or commons. Some trees and other vegetables may be said to be naturalized to situations which, but for art, they probably never would have grown upon. Thus, for instance, mountain plants are sometimes found common in plains, and even meadows; and alpine trees which disseminate themselves in level and warmer parts of the country: but then the person who is conversant with such matters, by comparing the effects of these different situations on the vegetable, always knows to select as general nature that which perfects all the parts, and where the soil and situation are best suited for the reproduction of the species or sort, and the prolongation of individual life. These rules are, it is said, founded in nature. For example; no person, judging from them, could mistake a warm English common as the natural soil and situation of Scotch firs, though they not unfrequently disseminate themselves there. It is, indeed, well known to every one in the least conversant with the vegetable economy, that in all herbaceous vegetables, and even shrubs of considerable size, the effect of removal to an improved soil, climate, and situation, is to expand the parts of the whole vegetable: that the effect of removing or cutting off part of the vegetable above ground is to expand those parts which remain: that the effect of removing any of the parts under ground, or of removing the whole vegetable into a colder climate and less congenial soil and situation, is to contract or consolidate the whole. This, were it necessary, could, it is said, be illustrated in a thousand instances from the commonest vegetables: but for the present purpose, it is only necessary to notice further, that this takes place more or less in a degree corresponding with the rapidity of the growth of the vegetable, and its duration. Thus, all the annual grasses are much farther removed from a state of nature by culture than the perennial ones. So are the annual garden vegetables, as cabbages, legumes, and spinach, in opposition to strawberries, asparagus, and many others. Quick growing trees or shrubs, as willows, raspberries, and some others, are also much easier removed from their natural state, than such as oaks, thorns, hollies, and heaths, which grow much slower. If these remarks and conclusions be just and well-founded, which, it is supposed, none will deny, it must follow that the same general effects take place more or less on all trees; that when they are removed into a colder climate, or have part of their roots cut off, it will in some degree contract the fibre of the wood, and render it a of more solid and hard texture; and that when they are removed into a warmer climate, have most of their branches taken off, or are placed in a better *state*, it must, by accelerating their growth, it is thought, tend to expand the fibre of the wood, and of course render the wood softer and more liable to suffer by the action of the common elements, when the tree is cut down and applied to use. That this does really take place, will, it is said, be gathered from the detached facts stated below, which have

come to the writer's knowledge, and to which every practical unprejudiced person, who has visited different parts of the kingdom, will, it is thought, be able to add many others from his particular observation, attention, and examination.

First, that every hedger and forester knows, that furze and thorns, which have been cultivated in fields or hedges, are of a much softer or wider grain, and are much easier cut over with the hedge-bill, than such as spring up from seed in a wild scenery, and never undergo any sort of pruning or cutting in, nor any kind of culture in any way. They know too, that in a common to be cleared of furze or thorns, or in a hedge to be cut over, there are some parts which require a much slighter stroke of the hedge-bill than others; and that those parts easiest to cut, are uniformly those where the plants have grown the quickest:—gardeners experience the same thing in pruning or cutting over fruit-trees or shrubs. Thus the difference between the texture of the cultivated and the wild raspberry is, it is said, striking, though the stem of the one is nearly double the thickness of that of the other. In all the other of these cases, the stems of both are supposed alike in diameter and cleanness, or absence of knots; though the same thing would, it is thought, take place in a considerable degree, even if the stem of the cultivated or quick growing one were thicker than that of the other in the wild state. Supposing that there were no other proofs, this, it is contended, clearly shews that cultivation, or whatever tends to increase the growth of a tree, tends likewise to expand the vegetable fibre. But there are other concurring proofs, it is said, which demonstrate this, and at the same time shew, what few, it is supposed, will doubt, that when the vegetable fibre is expanded, or when the annual ringlets or circles of wood, produced by a tree, are soft and larger than the general annual increase of such tree, the timber must be less hard, and more permeable by air, water, heat, and other matters, and, of course, inferior for all the purposes of timber.

Secondly, that it is well known that the common oak in Italy, where it grows faster than in this country, is comparatively of short duration. And that the oak which grows on the mountains of the Highlands of Scotland is much harder and closer than any produced in England, though on these mountains it seldom attains one-tenth part of the size of English trees. Every country carpenter in Scotland knows, it is said, the extreme difference between the duration of Highland and English oak for spokes of wheels. Many hedge-carpenters in both parts of the country know the relative duration of transplanted or *plantation* oaks, that is, the young oaks which are thinned out from thriving plantations of this sort, and those from natural forests, when employed as posts for railing. From different observations which the writer has made in Monmouthshire and Herefordshire, the duration of the oak in these counties, it is thought, is much inferior to what it is in Cumberland and Yorkshire: it is thought no exaggeration, when it is said that the difference is as eight to ten. Some timber dealers are known by the writer, who, in purchasing it, pay attention to the difference of soil and situation even in the same woods. When they can find oak in exposed situations and on deep clay soil, and all on rocky steepes, they always give them the preference in their purchases as timber.

Thirdly; that a known fact is stated by the writer which is said to be of such importance, that it is trusted, if it does not satisfy every unprejudiced person in respect to the truth of the general principles which are wished to be here laid down and explained, it will at least arrest the attention of all those who are interested in the quality as well as mere bulk

of timber : and this, it is thought, may lead to more extensive observations, and perhaps more favourable conclusions relative to it.

The plantations of the timber kind which were made at Kinnaird castle in the years 1770—1790, are, it is said, well known in the north of Scotland. They were chiefly of deciduous trees, among which were generally introduced larches for shelter. These larches, in some places, grow with astonishing rapidity. On many slopes, where the surface-soil was good though not deep, and the sub-soil a sandy gravel, they advanced upwards of five feet a year for the first six or eight years after being put in. As they overtopped and crowded the deciduous trees, they were gradually felled ; and as much had been said about the durability of larch-wood, the first trees that were cut down were fawn up, and applied to a purpose which was perhaps, it is thought, one of the best tests of their durable properties. This purpose was the foot-paths of peach-houses and vineries, where they were exposed to alternate drought and moisture, heat and cold, and where common deal and other kinds of wood had repeatedly failed. The larch deal of these trees was, it is stated, applied in the same way as the others, and in less than two years was completely rotten and destroyed !

It may, it is conceived, be alleged by some, that this could only hold true in regard to the *sap*, or last formed wood : but the *heart*, or red central wood which was present, though it lasted longer, did not, it is affirmed, endure three years ! The vast number of these trees annually taken down, were afterwards, it is said, chiefly made use of as fuel ; and though this wood had been asserted not to flame, or be consumed without the assistance of other wood, it did not, in this case, flame violently, but it burned by itself without care or attention, and unassisted from other timber-wood, producing numerous fires for labourer's uses. In rendering it fit for this purpose too, the workmen found it extremely brittle, a tree a foot in diameter being often broken with the greatest ease, by means of two or three blows given with the back of the hatchet. The tops and side-branches of them were likewise remarkably light and brittle, as are known to many persons in that part of the country as well as this. See *TIMBER, Crooked Growth of*.

These facts are said to deserve a very serious attention, and to lead to very important conclusions, in respect to the cultivation and growth of this tree as timber in this country. They are not solitary ones ; for though, as yet, sufficient time has not elapsed for a fair trial of this wood in different soils and situations, yet some have found it much less durable than others ; and that an attentive, nice observer will, it is thought, perceive larch-trees in some rich warm situations in a decaying state, and others growing so rapidly, or so much side-lopped or pruned, as to suggest doubts, whether their duration will be much longer than those of the above castle.

And, fourthly, that in Scotland, the difference of durability between common fir-wood which has been of slow growth, and that which has been *forced*, as it is termed, either by shelter, advantageous soil, situation, or climate, or by lopping off the side-branches, is known to every carpenter in the more northern parts of it, especially in the districts of Perth, Stirling, and Argyle. There, it is said, they distinguish the wood cut as timber in the native forests, from that obtained in plantations, by calling the former highland-fir, and the latter park-fir. The highland-fir is most esteemed, on account of its greater durability, being frequently found undecayed in ancient buildings when other sorts are entirely wasted. These circumstances are strongly supported, it is thought, by Mr. Lambert, who, in speak-

ing of the genus *Pinus*, has said, that " this striking difference between the highland and park fir, is probably to be attributed to the mountainous and rocky situations in which the native timber is found, and where, the trees being of slower growth, the wood is consequently of a harder texture." The same writer is of opinion too, it is said, that few species of pines will endure more than forty years in the soils in which they are commonly set out or planted in England. Indeed, there are many proofs of this, it is thought, from Croom, Kew, and other places ; though there are some excellent fir-trees at Langhangles, where the soil is deep and cold, that are much older than that period. The greater durability of the former sort of fir-timber may be daily seen, it is said, in the still more northern districts of Aberdeen, Bannockburn, and some others, during the removal of old farm-houses and cottages ; as wherever a piece of the highland-fir appears, it is always of a much deeper yellow than the park or low country fir. At Gogar, it is said, some large fir-trees were taken down in 1795 : they grew upon a deep cold loam ; the wood was fawn up, and was found of excellent quality as timber. About a mile from this, at Lenny Park, a dry bank is covered with fir-trees of greater age than those of the former situation ; some of them have been taken down at different periods before and since that time, and have uniformly been found of inferior quality as timber-wood. In 1804, too, a number of fir-trees were taken down from the rocky banks of the Almond, between Craigie Hall and Cramond House ; and they were found of excellent quality in their wood. While at Bevelaw, there are extensive plantations of fir-trees, which have been often thinned ; but the trees have grown so fast, and been so much cut or pruned in the branches, that they never last long, it is said, as paling. All these cases have either come under the writer's own particular notice, or that of a relation of his, who is highly interested in the value of park-fir, and, of course, has paid a more than common attention to the matter. A great number of other instances might, it is said, be here added, but it is unnecessary : and the comparison of the wood of the common crab, the father of the orchard, with that of the cultivated apple, is in support of the same. Any person who will take the trouble to examine the fir-woods at Gordon Castle, and contrast them with others in the county of Perth, and those in England, will, it is thought, unquestionably come to these conclusions : that *slow growth* is essentially necessary to the *durability* of fir-timber ; and that wherever the *accumulation* of wood has been *accelerated* by culture of the soil, improvement of the climate, or by cutting and pruning, it is *injured* in quality in proportion to the ratio in which these agents have been employed. It is not said, that no branches should ever be cut from fir-trees, but that it is certain that judgment must direct to cut off, *in general* only, such as indicate that they are no longer of much use, which is easily discovered by marks of approaching decay.

Much of the above principles, reasonings, and conclusions, is probably, in some measure, equally applicable to other sorts of timber.

In the raising and growth of timber of the fir or Scots pine kind, it is found not well suited to very elevated situations, as the sharpness and keenness of such exposures bring it too quickly into a state of decay and death. The writer of an agricultural survey of one of the more northern districts of Scotland has remarked, that there is a kind of laminated clay, much disposed to dissolve with water, which is not favourable to the growth of this, or any of the pine tribe. It succeeds very well, it is said, however, in  
most

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most parts of the clay ground of that tract, if care be taken to prevent stagnant water. It does exceedingly well too on land covering the freestone rock; but that the best timber of this sort is produced on hard dry gravelly soils. But that the Siberian pine, and some others of a similar nature, have been introduced with very little success. The short intervals of mild weather which happen in the beginning of the spring, excite them to vegetate too early, and the next cold blast destroys the young buds. The New England pine thrives in a tolerable soil, until from twelve to twenty years of age, in proportion to the nature of the exposure, after which it generally begins to decay. And that the spruce is likewise unfit to weather the storm on the greatest heights. It succeeds on the hard dry rock where the Scots pine dies, but frequently decays at the end of eighteen or twenty years, on stiff wet clay. Its most favourite soil for timber is that which is dry and gravelly. The silver fir thrives in clay soils, where the spruce fails; nor is it averse either to the hard rock or gravelly soil, which probably affords the best timber; but it makes little or no progress on any soil that is very poor. It unfortunately too frequently suffers severely from the frosty mildews of the spring, especially in its youth, or more early state of growth. However, the *larix* or larch is now found to be the most hardy alpine plant. In moist places, it makes greater progress than almost any other timber-tree, and there is scarcely any soil, that is not drowned with water, on which it will not succeed. It suffers most in too luxurious situations, where its soft shoots, unable to keep erect, bend away from the slightest gale, and its timber produce is probably the worst. It is liable while young, in some situations, to be much injured or wholly destroyed by early spring frosts taking place after mild weather has brought on its vegetation, and is occasionally seized with disease, and dies when placed on miry clay.

It is suggested that the birch is next to the larch in the progress of its growth, and equal to it in ability to stand the blast in alpine situations; and that it is superior to it in the plain. But in whatever situation it is placed, it delights most in a light soil and dry bottom, probably producing in such the best timber-wood. It, however, thrives in moist soils, with very moderate draining.

The ash also, when it enjoys a sufficient depth of good soil, is capable of braving the storm, and pushing up its head in the most exposed situations; however, in a thin soil, covering a stiff argillaceous bottom, it can make no progress. It notwithstanding thrives well in some marshy soils, where the banks are steep, so that the water gets away without stagnating. On dry rocky steeps, the timber is probably the best. It forms perhaps the most important wood in the country as timber, being useful in all its ages and states, and fit for most purposes.

The mountain-ash is likewise a hardy native, which grows freely in almost all soils and exposures; but its favourite situation seems to be in hanging banks, among woods and coppices, where the timber-wood is perhaps the best. This and the gean-tree, or wild cherry, raise and propagate themselves much when left at liberty, by putting up or out suckers from their roots.

The beech is said to come near to the ash in capability of braving the storm, and has much the advantage of it in thriving in poor or stiff soils; but there are some barren argillaceous bottoms too much even for the beech; and it is most successful, and affords the best timber, in friable soils. Its shoots, while young, are soon affected by frost, but the tree speedily recovers.

The sycamore and elm require a light soil, and a dry,

open under-stratum: and when this is the case, the timber is the best, and the trees thrive in a situation pretty much exposed. They form good timber too on some soils of a heavier nature.

In regard to the oak, it is less patient of the blast than most of the timber-trees of the forest. Being late in putting forth its leaves, it continues to grow till the season is far advanced; and the immature wood of its late shoots, unable to resist the piercing effects of the cold wind in exposed situations, withers before the next spring; so that, like Penelope's web, the progress of one season is undone in the following. The most favourable situations for the oak, as timber or otherwise, are therefore hollows or hanging slopes, where the sharp cutting winds are broken by the neighbouring heights. In such situations, if stagnant moisture be avoided, it will thrive in the stiffest soils, and with its strong roots penetrate the deepest bottoms, affording good timber. Though the growth of this tree be slow in infancy, when it is placed in a favourable situation, it will make a progress in the course of fifty years, little inferior to many other kinds, and at length arrive at a great size of timber. See these timber-trees.

It has been found that the horse chestnut-tree thrives well on the lower grounds, and deep soils only. The sweet chestnut, which quickly becomes a timber-tree in districts more northern than this, does not succeed here. Its seasons of growth are too early, or too late, for the climate. In its first, it bears some resemblance to the Siberian pine, &c.; in its last, to the oak; its early growths being almost as early as the former, and its later being nearly as late as those of the latter, and still more soft and susceptible of the cold. Hence its shoots are alternately put forth and destroyed, and it generally becomes a low, stunted, shrubby tree. But this, it is said, does not seem to have always been the case. The fate of the common walnut, which may be considered almost as much a timber as a fruit-tree, is nearly the same with that of the sweet chestnut. It probably affords the best timber on dry friable soils of some depth.

The poplar and most of that tribe delight most in water-formed soils, but are commonly averse to marsh, and, when happily situated, make quicker progress than almost any other sorts of trees, producing much light useful timber. See CHESNUT, WALNUT, and POPLAR.

*Management of Timber.*—The rules and regulations for the management of fir and other timber-trees, which are given below, deserve attention. Mr. Salmon, of Woburn, in Bedfordshire, who is in favour of much lopping or cutting of the side-branches of fir-timber, remarks, in a late volume of the Transactions of the Society of Arts, &c. that considering the purposes that this sort of timber is commonly applied to, it must occur that clearness of knots, straightness, length, and equality of size of the trunk, constitute its perfection, and that, if deficient in all these, it is of no value but for the fire. Next to these considerations, and the prospect of an improved knowledge of raising and cultivating this kind of timber-wood, it may, it is said, be a fair question, if our own country be not capable of producing this timber little or not at all inferior to foreign fir? In this country at present, fir appears, it is thought, not for any length of time to have been considered much otherwise than as ornamental. For this purpose they serve only for a certain time, which, when past, it has been their fate to be cut down long before having attained maturity. But from the great extent of ground now covered with this sort of timber-tree, it is to be hoped, it is said, that another century may obtain to English fir some of the character of the oak of the same country: towards such an end, if attainable,

every means should, it is said, be used, and towards which nothing appears more likely to succeed, than a well-grounded general practical mode of management, from the time of the trees being put out, to their greatest imaginable age of improvement. That a knowledge of such may by perseverance be gained, is not, it is said, much to be doubted, as from different specimens there appears great reason to conclude, that early and proper side-logging the branches, and thinning out the young trees, will form a considerable feature in the plan and system to be adopted and pursued.

The subsequent plan and rules for the general management in these cases, are given as the partial result of practical experience, but of only a few years' observations.

In the raising of this sort of timber, from every authority and observation, there can be no doubt, it is thought, that all firs should be set out or planted thick or near together, as not more than four or five feet apart. That where firs of the same kind are put out together, there is less loss of plants, too, from one sort not overgrowing and destroying the others; consequently, that it appears advisable that all the different sorts should be set out separately by themselves. If any admixture at all be admitted, the Scotch fir and larch may, perhaps, best succeed together; but this is not certain, and they will unquestionably be best separate on two accounts; first, because they are not so likely to injure each other; and, secondly, because the larch may be put into the soil best suited for it, and the Scotch fir the same. And that in raising any particular sort extensively, it may be right to have a few of the spruce sort, or others, on the out or exposed sides, to prevent mischief from sudden gusts or blasts of wind: but if the situation be not liable to such gusts, the spruce had better be omitted, being mechanical agents only, and, by excluding the sun and air, act against the operations of nature. However, in these hints, ornament is not, it is said, considered, but only timber: if the former be wanted, and profit also, then the spruce, the larch, the silver, and some other sorts, may be combined.

It is contended, that from some years' observations on cutting out and side-logging the branches, and the effects thereof, it appears certain that fir-trees, whenever they arrive at a certain age, should be cut or lopped to a certain height; and that for regulating thereof, the simple rule given below is recommended: the cutting-in to commence when the trees are six years old, or when there is discernible five tier of boughs and the shoot; the three lower tier of boughs are then to be taken off. After the first lopping or cutting-in, the trees to be let alone for four or five years, and then, and at every succeeding four or five years, the cuttings-in to be repeated, till the stem of the tree be clear to forty feet high, after which, as to such side-logging, it may be left to nature. The rule for the height of thinning and cutting-in, after the first time, to be half the extreme height of the tree, until they attain twenty years' growth, and after that time, half the height of the tree, and as many feet more as it is inches in diameter at four feet from the ground. This cutting-out and retrenching the branches of such trees is known, from repeated observations, it is said, not to be excessive; and that the rule is calculated to check the too tapering top, and for strengthening the slender bottom, by carrying the cutting and retrenching to a greater proportionate degree, in a ratio compounded of the height and bottom bulk; and by this rule, too, it may be observed, that the trees will be at top clothed with somewhat less than half their branches. The proper time for such cutting-in is, it is said, between September and April, and the tool to be employed in the business, the saw.

It is noticed, that orderly thinning the trees at certain

periods, when for timber, is the next essential to that of cutting in and lopping their side-branches; and that for this purpose, observations have been made on the most orderly and thriving collections of this sort of trees, and the subsequent simple rule is laid down: keep the distance of the trees from each other equal to one-fifth of their height. In the application of this rule to this purpose, it is evident that each individual tree can never be made to comply, for the original distance (even if set out in the most regular order) will allow only for certain modifications, by taking out every other tree, and so on; but even if the obtaining such equal distance were practicable, experience would shew, it is thought, that another way should be preferred, of which the eye must be the judge, by taking out such trees as are least thriving, stand nearest to other good trees, &c. &c. at the same time keeping in view the rule laid down: the directions and rules for which, given below, may easily be proved, by measuring a chain square, or any quantity of the land, and counting the trees thereon; then, by trying the height of two or three trees in that quarter, and taking one-fifth of such for the distance, it would be readily seen how many trees for timber should be contained in the piece measured: or the practice may be more simply regulated, it is said, by taking the distance of eight or ten such trees added together, the average of which should be equal to a fifth of the height of the trees. In these rules and directions there is nothing impracticable or complicated, it is thought.

The writer states, too, that he has for years known the expence and produce of this side-trimming alone, and finds that in Bedfordshire the produce of it doubly repays the charge or cost; and that although some experimentalists may differ from him, or time may shew some reason for somewhat deviating from his rule, it is presumed all will agree that some simple plan is advisable, instead of having timber collections and woods mismanaged, to the great loss of the community and their proprietors. If such a plan of proceeding, as is here proposed, be generally promulgated, if not perfect, it will most likely, it is thought, in time become so, and thereby have its advantage; and in order to promote this, these concluding remarks are given: in the common course of gardening, it is understood that cutting and trimming invigorate the tree; that taking off the side-branches makes the upright ones shoot the stronger; and by cutting out the dead and decayed wood, the tree is kept alive: some of this doctrine will, it is supposed, certainly apply to the tribe of firs; it will certainly, too, substitute clean timber-wood for knots: and of all this treatment, from their particular uses, they of all other trees stand in most need, and will be the most improved by it. And that should it be admitted that the like treatment would on the fir, as well as other trees, produce the like effect, it would lead to a well-grounded expectation that, as well as producing clearness from knots, straightness, and length, the same operation would advance the quality nearer to that of foreign fir; for it may be traced, that where trees are tall and clear of boughs or knots, the whole substance of the wood is better and of finer grain, and that it appears likely that such will always be the case; the reason of which may probably, it is thought, be inferred from the sap having farther to rise and descend, and having no boughs to divert or delay it, the circulation must be more free and rapid, most increase be left in the neighbourhood of the boughs at the top of the tree, and least on the sides at the lower part, consequently adding to the length of the head, and rendering more fine each annual increase to the body; thereby producing a close-grained, clean, long, and regular easy-

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easy-tapering useful piece of timber, instead of a coarse-grained, short, sudden-tapering trunk, with a quantity of boughs and knots.

The foregoing rules, directions, and observations, are meant, it is said, to apply to fir-timber only, but to a certain extent they may be applied to other timber; though by no means in the same degree or age. But if had recourse to as far as the first fourteen years of their growth, and then such cutting and side-logging be altogether omitted, and the thinning out very much increased, any collection of such timber-trees would, it is thought, be rendered much more valuable than if left to nature.

The first of the above writers has, however, already stated, that the general effects of side-cutting or lopping the branches of fir, and probably some other timber-trees, are of a corresponding nature with that of culture; that is, to increase the quantity of timber produce. And that the particular manner in which it does this, is by directing the greater part of the sap, which commonly spreads itself in the side-branches, into the main stem. This must, of course, necessarily enlarge that stem in a more than ordinary degree, by increasing the annual layers or circles of wood.

Now if the tree happen to be in a worse soil and climate than those which are natural to it, this will, it is supposed, be of some advantage, as the extra increase of timber will still be of a quality not inferior to what would take place in its natural state; or, in other words, it will agree with that state of quality and quantity of timber which the nature of the species, or sort of tree, admits of being produced. But if the tree be in its natural state, the annual increased produce of timber occasioned by this cutting or lopping the side-branches, must necessarily injure its quality, in a degree corresponding with the increased quantity. And if the tree be in a better climate and soil than that which is natural to it, and at the same time the annual increase of wood be promoted by such cutting means, it is evident, it is said, that such wood must be of a very indifferent quality from that produced in its natural state.

Consequently, although it might, in some degree, it is supposed, be shewn from vegetable anatomy, and the analogy of what takes place in herbaceous vegetables, it is preferred to deduce, from the facts stated above, this proposition: that whatever tends to increase the wood in a greater degree than what is natural to the species or kind when in its natural state, must injure the quality of timber. Cutting or lopping the side-branches tends to increase this in a considerable degree; and, therefore, it must, it is thought, be a pernicious practice, in so far as it is used in these cases.

It has been shewn, it is said, in a very striking manner by Mr. Knight, that timber is produced, or rather that the alburnum, or sap-wood, is rendered ligneous, by the motion of the tree during the descent of the true sap. It is sufficiently known, too, to all who have attended to the physiology of vegetables, and greatly confirmed by some experiments not long ago communicated to the Royal Society by the same writer, that the solid texture of the wood greatly depends upon the quantity of sap, which must necessarily descend, and likewise on the slowness of its descent. Now both these requisites are, it is contended, materially increased by side-shoots or branches, which retain a large quantity of sap, and by their junction with the stem occasion a contraction and twisted direction of the vessels, that obstructs the progress of this juice. That this is true in fact, is well known to those accustomed to make wine from maple or birch trees, as in this business it is found that those trees which have the fewest side-branches, bleed more freely than the others, but during a much shorter

space of time. These hints, consequently, afford additional evidence against the practice of cutting or lopping the side-branches of timber-trees, and especially against that of using it for fir-trees, which, as the above writer justly remarks, it is said, have larger vessels than most others, and therefore, when in an improved soil and climate, side-branches for the above purposes are essentially necessary, if solid, resinous, and durable timber be the object in view.

The following conclusions may, of course, it is thought, be drawn in respect to the management of timber-trees from the above facts and remarks. First, that timber-trees should be set out in soils, situations, and climates, as much as possible analogous to those of their natural state; and that it is chiefly in this state, or where there are some defects in regard to them, that such cutting or lopping and culture can be exercised with advantage. Secondly, that in proportion to the superiority of the soil, &c. in which trees are put, over the natural soil of such trees; in the same proportion lopping and cultivating the soil ought to be avoided, and thinning encouraged. Thirdly, that particular regard should be had to the soil and situation, where either larches or any of the pine tribe are placed out to remain finally for produce as timber: for as the roots of these chiefly run along the surface, and as in them the great current of the sap is principally confined to one channel, that is, the trunk, that tribe of trees is, of course, peculiarly liable to change when subjected to unnatural agency of these kinds. Fourthly, that the only way in which oak-timber of *safe* quality can be raised and provided for the navy of this country, is by inclosing, preserving from cattle, and properly managing, those royal forests where oak is the natural produce of the soil. The neglect of this advice, there is reason to fear, it is said, may at some future day be regretted. For park-oak, as has been seen, is by no means unfrequently much inferior to that of the forest kind in durability. And that, lastly, as the practice advised tends to render trees characteristic of their peculiar species or kind, it must consequently be the most agreeable to ornament too, or the principles of natural taste.

The necessity of considering, thus fully, this branch of the management of timber-trees is, because the matter seems, it is said, to have been almost entirely overlooked by practical men, who appear, in general, to think culture and lopping, or cutting-in, of no other utility than to increase the produce in the quantity of timber. Though they are not, however, to be discarded in many other views, yet if solid and durable timber be the object, they ought, it is thought, to be had recourse to with caution, and in a discriminate manner. As a contrary plan of proceeding has been attempted to be enforced by some, as has been seen, it is thought necessary to arouse the attention of the country to the raising and improved management of the important article of timber, especially as the consequences of that plan are supposed to be more dangerous, as they cannot easily discover themselves until it be too late to apply a remedy.

In the management of timber-trees of the deciduous kinds, the lopping, cutting-in, and thinning, should be practised, in some measure, on the same principles as the above, but according to the particular nature, circumstances, and habits of growth of the different sorts; being constantly executed in such a manner, as to prevent any injury or inconvenience arising by the too extensive growth of the lateral shoots or branches, these being too few in number for the proper retention of the sap; and without the trees being left at too great a distance, and too naked and exposed. The trees for timber too are always to be kept clear of all foul wood, and any branches to be removed, taken off in a clean, careful, up-

ward direction, as where the parts are left in any way rugged or uneven, they are liable to catch and detain the wet and moisture, and conduct it to the hearts of the trees, by which they are not only greatly hurt in their growths, but often much spoiled as timber-wood. The thinning of the trees for timber should be performed at different suitable periods, so as to prevent too much crowding, and afford proper room for the full growth and increase of their wood, on the principles laid down above. See PRUNING and THINNING.

Sir Humphrey Davy has remarked in a late work, that trees possessing the firmest and the least porous heart-wood, are the longest in duration. That, in general, the quantity of charcoal afforded by woods, offers a tolerably accurate indication of their durability: those most abundant in charcoal and earthy matter are most permanent; and those that contain the largest proportion of gaseous elements are the most destructible. That, amongst our own trees, the chestnut and the oak are pre-eminent as to durability; and the chestnut affords rather more carbonaceous matter than the oak. That, in old Gothic buildings, these woods have been sometimes mistaken one for the other; but they may be easily known by this circumstance, that the pores in the alburnum of the oak are much larger and more thickly set, and are easily distinguished: whilst the pores in the chestnut require glasses to be seen distinctly. That, in consequence of the slow decay of the heart-wood of the oak and the chestnut, these trees, under favourable circumstances, attain an age, it is said, which cannot be much short of a thousand years. The beech, the ash, and the sycamore, most likely, never live half so long.

It is noticed too, that the oak and chestnut decay much sooner in a moist situation than in a dry sandy soil; and that their timber is less firm. The sap-vessels, in such cases, are more expanded, though less nourishing matter is carried into them; and the general texture of the formations of wood necessarily less firm. Such wood, it is said, splits more easily, and is more liable to be affected by variations in the state of the atmosphere.

The same trees, in general, are likewise much longer lived in the northern than in the southern climates. The reason of which seems to be, it is thought, that all fermentation and decomposition are checked by cold; and that at very low temperatures, both animal and vegetable matters altogether resist putrefaction: and in the northern winter, not only vegetable life, but likewise vegetable decay must be at a stand.

The antiputrescent quality of cold climates is, it is said, fully illustrated in the instances of the rhinoceros and mammoth lately found in Siberia entire, beneath the frozen soil, in which they most probably have existed from the time of the deluge.

Trees that grow in situations much exposed to winds, have harder and firmer wood than such as are considerably sheltered. The dense sap is determined, by the agitation of the smaller branches, to the trunk and large branches; where the new alburnum formed is consequently thick and firm: such trees abound in the crooked limbs fitted for forming knee-timber, which is necessary for joining the decks and the sides of ships. The gales in elevated situations gradually act so as to give the tree the form best calculated to resist their effects. And the mountain oak rises robust and sturdy; fixed firmly in the soil, and able to oppose the full force of the tempest.

Different states of timber are chosen for different uses, but the above writer remarks, that ship-builders prefer for their purposes that kind of oak-timber afforded by trees that have had their bark stripped off in the spring, and

which have been cut in the autumn or winter following. The reason of the superiority of this timber is, it is thought, that the concrete sap is expanded in the spring in the sprouting of the leaf; and the circulation being destroyed, it is not formed anew: and the wood, having its pores free from saccharine matter, is less liable to undergo fermentation from the action of moisture and air.

It must, however, be considered as very extraordinary, that in a country where the navy is a matter of such vast importance, and in districts where the oak, or other sorts of timber-wood useful for the same purpose, may be said to be almost the staple articles, no complete or satisfactory trials should have yet ever been made of the means of increasing the duration of such timber, which are mostly so readily practicable, and so very material in their consequences.

*Felling of Timber.*—The proper periods or times of cutting down, or making *falls* of timber, as they are often called, must evidently, in some measure, depend upon and be regulated by the nature and the differences in the circumstances of the growths of the same or different kinds of trees. But as in them, as well as other living matters, there seem to be three stages of growth; as that of their early rising, their middle mature state, and that of their decline or decay; they may serve as more satisfactory guides in the business. In the first, the growth is mostly soft and rapid; in the second, it becomes firm, strong, and perfect; and in the last, it begins to become weak and unsound. Mr. Loudon has considered the beginning of the middlemost of these stages as the most profitable period or season for felling of timber; as after that time, though the tree may appear sound and healthy, its annual increase is so little, that the cutting it down and replacing it may be more beneficial than letting it remain. The number of years that a tree may stand before it arrives at such a state, must, it is said, vary in different soils, situations, and exposures; but the period itself may readily and without difficulty be ascertained,—by the annual shoots, the state of the bark, and by taking the circumference of the tree at the same place for two or three successive seasons, and comparing the difference. In the view of profit from timber produce, it is of material consequence, it is said, to cut down such collections of trees at maturity, or in their vigour and perfection, which, some suppose, for the oak, where the soil is natural, is from about the age of fifty to sixty or seventy years' growth. Many trees will stand a half, others a whole century after they are full grown, appear quite healthy, and, at the same time, make little or no increase of timber. There are particular cases too, depending on the nature and state of the markets, in which it may even be more profitable to cut timber before it is arrived at a full growth than afterwards.

It may be difficult, it is thought, to say when timber, which is principally planted for ornament, should be cut down. A tree, when young and fresh, is beautiful; when middle-aged, it is more or less picturesque; when in old age, strikingly so, with a degree of grandeur; and its greatest height of picturesqueness and sublimity, is when decaying under the pressure of age. Hence it is conceived, that if ornament, or expression, which is a more appropriate term, were the sole object in view, trees need almost never be cut down. But most persons have a feeling of what is beautiful; and though all may be struck with grandeur or sublimity, few have so much enthusiasm as to sacrifice the profit of valuable timber, for the pleasure of enjoying either of those characters.

The time and manner of cutting *underwood* and *undergrowth* will be seen under these heads.

There are persons in this country, who, unquestionably from

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from neglect and mismanagement of their timber, are now, it is said, losing annually very handsome incomes. The loss of price which generally follows the refusal of a good or high offer, the certain loss of interest, the decay of timber, and the injuries arising from the incumbrance of full-grown trees, are irretrievable losses, which those who have the care and management of timber should studiously endeavour to avoid. But while the disadvantages of suffering timber to stand until it be overgrown are thus held out, it is far from proper or advisable to propose or favour the premature felling of it.

The season of the year for this work usually commences about the end of April; because the sap then rises, which makes the bark *run* freely, as it is technically termed; that is, it *strips* off the trees freely; so that where a quantity of timber for ordinary uses is to be felled, the statute 1 Jac. 1. c. 22. formerly required it to be done between the 1st of April and the last of June, for the advantage of tanning; but this act was repealed by 48 Geo. III.

However, the opinions and practices of authors are very different as to the best season for felling timber: Vitruvius recommends an autumnal fall; others advise December and January: Cato was of opinion, that trees should have borne their fruit before felled; at least, that their fruit should be first ripe; which coincides with the sentiments of Vitruvius.

In effect, though timber unbarked be most obnoxious to worms, yet we find the wild oak, and many other kinds, if felled too late, when the sap begins to be full, to be very subject to worms; whereas about mid-winter, it neither casts, rifts, nor twines. If trees were felled at a more early season than April, it is said that the timber would be better seasoned.

It is, indeed, the common opinion, that timber which is felled in winter, is stronger, and more lasting, as being more firm and close, than that which is felled in summer. But M. Leeuwenhoek apprehends that there is no difference, except in the bark, and outermost ring of the wood, which in the summer are softer, and more easily pierced by the worm: wood consisting of hollow pipes, which, both in summer and winter, are full of moisture, and do not shrink in winter; and therefore the wood cannot be closer at one time than another, for if otherwise, it would be full of cracks and clefts. The unexpected and sudden rotting of some timber, he conceives to proceed from some inward decay in the tree before it was felled: having observed all trees to begin to decay at first in the midst or heart of the tree. Phil. Trans. N<sup>o</sup> 213. or Abr. vol. i. p. 592.

The ancients had a great regard to the age of the moon in the felling of their timber. If their rules avail aught, they are these: fell timber in the wane, or four days after new moon; some say, let it be the last quarter. Pliny orders it to be in the very article of the change, which happening on the last day of the winter solstice, the timber, says he, will be immortal: Columella says, from the twentieth to the twenty-eighth day: Cato, four days after the full: Vegetius, from the fifteenth to the twenty-fifth, for ship-timber; but never in the increase, trees then most abounding with moisture, the only source of putrefaction.

Some even have a regard to the temper and time of the day; the wind to be low, neither east nor west, neither in frost, wet, nor dewy weather, and finally, never in the forenoon.

Lastly, some regard is had to the species: fir is best felled when it begins to spring, both as it then quits its coat best, and as the wood, according to Theophrastus, is by that means rendered wonderfully durable in water. Elm, says Mr. Worlidge, is to be felled between November and Ja-

nuary, in which case it will be all heart, at least the sap will be very inconsiderable: this, he adds, is also the only good season for felling ash. Some authors add farther, that in felling timber, care should be taken, first, only to cut it into the heart, and so to let it stand till dry; by which means the moisture is evacuated in drops, which would otherwise occasion putrefaction.

M. de Buffon observes, as a circumstance which greatly increases the strength and solidity of timber, that the trees intended to be felled for service, should first be stripped round of their bark, and suffered to stand and die upon the spot before the cutting. The fappy part, or blea of the oak, becomes by this management as hard and firm as the heart, and the real strength and density of the wood has been proved by many experiments to be greatly increased by it: nor is this practice detrimental to the proprietor, because the remaining stumps of these trees send up their young shoots as vigorously, as if they had been cut down in their natural condition. Mem. de l'Acad. Sc. Par. 1739.

When any tree is to be cut down for timber, the first thing to be taken care of is a skilful disbranching such limbs as may injure it in its fall. In felling the tree, it should always be cut as close to the ground as possible, unless it is intended to be grubbed up; and this will be of advantage both to the timber and the wood; for timber is never so much valued, if it be known to grow out of old stocks.

There are several different modes made use of in felling or taking down timber, and they must necessarily be somewhat various, according to the nature, extent, and kind, of which the collection may be, as well as in the methods of performing the work: thus, in groves of the deciduous timber kind, the trees are mostly best felled by gradually taking or thinning them out as they arrive at maturity; which, where they are to be continued, should be cut over by the surface of the ground, and the stools be each separately well fenced in, that by defending them from cattle, new trees may be produced; but when not designed to be continued, they may at once be rooted out. Groves of the fir or pine sort, or any single fir-tree of any kind, should at once be taken out by the roots. In woods, any timber-trees that may be cut down, should have their places as nearly as possible supplied by sapplings, or any other proper sorts of young timber-trees. However, previous to the work of felling, the trees should be marked by a proper person; in performing which, in a *fall* of timber, regard is to be had to the relative state of standing in the trees. In close timber-woods, the whole or nearly the whole may be marked and taken down; as if some which appear flourishing be left standing, they will not only be liable and in danger of being hurt in taking the others down; but, in consequence of their situation in regard to exposure being changed, will no longer continue to flourish. As their atmosphere is not only thus altered, and rendered too cool, perhaps, for their acquired habit, by the removal of the adjoining trees; but they thereby get room to throw out side-shoots from their stems; in consequence of which their tops die, and their growth is irrevocably stunted. While, on the contrary, in open woods of the same kind, thin hedge-rows, and other open spaces, such timber-trees only as are ripe for the axe, or are suitable for the intended purpose, should be marked: the youthful growing trees being left to be benefited most probably by an increase of air and head room, in an atmosphere and exposure to which they are habituated and accustomed. On estates that are timbered, it is directed that they should be frequently gone over by proper persons, who, let the price and demand for timber be what they may, should mark every tree which wears

wears the appearance of decay. Where the demand is brisk and the price high, he should go two steps further, and mark not only such as are full grown, but such also as are near perfection; for the interest of the money, the disincumbance of the approaching young timbers, and the comparative advantages of a good market, are not to be bartered for any increase of timber which can reasonably be expected from trees in the last stage of their growth.

In the work of felling timber, three distinct methods are practised and had recourse to in different cases; as, first, that of cutting the trees *above ground*; severing them from their roots, by means of the axe or the saw; leaving what are termed *floods*, to occupy the spots where they stood. Second, that of cutting them, *within* the ground, with the axe and mattock; but leaving the principal parts of the roots in the soil. And third, that of *grubbing* them up by the roots, by the use of the spade and mattock; thus throwing them down with the butts and large roots adhering to the stems. The preference to be given to one or other of the two first modes of taking down timber-trees, rests, it is said, chiefly on the nature of the future application of the land upon which they grow. If it be intended to remain in the state of woodland, the first method, or the second, if too much of the main roots be not cut away, is the best and most eligible. But if the land is to be cleared for the purposes of agriculture, where sufficient hands can be had for dispatching the business, the second is, by far, the best. The last is improper in most cases.

The writer of the rural economy of the midland districts states, that there the methods of *stocking*, *axe-grubbing*, and *axe-felling* are practised. That the first is a kind of partial grubbing, in which the roots are cut through a foot or more from the stem; and, again, a foot or more from the inner cutting; taking up a short length of the thickest part of the roots, and digging a trench round the tree, wide enough to come at the downward roots. That the second, or *axe-grubbing*, is somewhat similar to the mode of grub-felling described below, except that the end of the butt is left larger in these places than in that case. And that the third, or *axe-felling*, is the common method of Yorkshire, and other places, of cutting off above ground, with the axe; a method which is seldom practised, except in some few cases where another crop of timber, or of coppice-wood, is designed to be taken. Stocking is the prevailing mode;—the charge for taking down varying with the size of the tree: for a tree of two feet in diameter, it is about a shilling; and about four-pence more for cutting off the butt; the stocking and butting being, for the most part, let together. Other modes, too, are practised in other districts in performing the business; as that of sawing the trees off in an horizontal manner close by the surface of the ground, by means of a long saw with one or both handles fixed on the upper side, the trees being first dipped in by the axe on the falling side.

The method of falling timber practised in the county of Norfolk, is said, by the same writer, to be uniform, and perhaps peculiar to the county. It is very aptly called grub-felling; the operation partaking both of grubbing and of felling with the axe, in the common way above ground; a method which is wasteful of timber. The woodman of this district, therefore, fells below the surface of the ground, by cutting off the horizontal roots close to the stem, which, instead of shortening, he, in effect, lengthens, by adding to it a conical point, cut out of the crown of the root; so that by this way of proceeding, a greater length of timber is obtained, than by first grubbing and afterwards cutting off

the butt with a saw. Grub-felling is, it is thought, without doubt, the most eligible way of taking down hedge-row timber; and this, it is supposed, accounts for its being the established practice in the above county.

The disposal of timber, which often takes place before it is cut down, is to be regulated by the *occasion* of it, as arising from the *state* of the timber, or other causes and circumstances. It is, however, seldom proper and beneficial to fell and cut it down before its most profitable state of growth is reached; though this principle may sometimes be set aside by particular circumstances, as the nature of a market; the value of the land it encumbers by its growth, being greater than its annual increase; the interest of the money it is worth, with that of the growth from the floods, being greater than the increase of the standing timber, &c. It is consequently rarely advantageous to suffer timber to remain upon its roots, after it has attained its *full growth*;—as, in this case, the whole of the interest is lost, it is said, to the owner; while the use of one of the most valuable articles of the produce of the country is lost to it and the whole community.

In speaking of oak-timber, the late bishop of Landaff has given some useful and interesting remarks in regard to the disposal of it, in the introduction to the Agricultural Report of the State of the County of Westmoreland. Where profit is considered, it is said every tree should be cut down and sold, when the annual increase in value of the tree by its growth, is less than the annual interest of the money it would fell for. This being admitted, it is only necessary to inquire into the annual increase in the value of oaks of different ages. After different statements, thirty-six shillings each are fixed upon as the price of trees that should be cut down and sold; as, if they be cut down before they arrive at that value, or if they be allowed to remain until they will fell for a much higher price, the proprietor of the soil or land on which they grow will be a loser. It is noticed too, as being the general opinion, that it is more profitable to fell and sell oak-wood at fifty or sixty years' growth, than to let it stand for navy timber to eighty or a hundred, owing to the low price that is now paid for oak-trees of large dimensions, either by the Navy Board or the East India Company. On this account, it is advised making a much greater increase of price than ordinary on timber of this sort of large scantling, as in place of four or five pounds the load, if eight or nine were given for trees containing each one hundred cubic feet and upwards, every person in the kingdom, it is thought, would have a reasonable motive for letting his timber stand until it became of a size fit for the use of the navy; whereas, according to the present established price, it is every one's interest to cut down and sell their trees before they arrive at a proper size to be useful as navy timber. This suggests, too, the necessity of attending to the royal forests in a more particular manner; and may be an additional inducement to the trying the cultivation and growth of the larch in them, and training it for ship-timber. See *TIMBER, Crooked Growth of*.

There are several different modes of disposing of timber according to the nature of it, the situation, and the customs of the districts to which it belongs; but the principal of them are, first, those of felling the trees standing; either by *auction*, by receiving *written* proposals, or by *bargain and sale*: second, cutting the trees down, and felling them in the rough; by any of the above modes: third, converting the fallen trees; that is, cutting them up into wares to which they are best adapted, or which are most saleable in the particular situation. On a large timbered estate, the first mode

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is, in common, the most advisable to be had recourse to; in which case, an accurate *valuation* of the marked trees is to be made, before they are offered for sale: and, in the case of oak timber-wood, it is mostly proper, and always satisfactory, to have separate valuations of the timber and the bark.

In felling timber in the county of Norfolk, the prevailing practice is, according to the writer of the rural economy of that district, to fell it standing, at so much a ton when fallen; measuring the timber down to six inches timber girt; the *topwood* and the *bark* (of oak) becoming the property of the purchaser; who is usually at the expence of taking it down. And it is customary there, too, for the purchaser to dispose of the bark (of oak), and sometimes the topwood, by the same admeasurement.

In the midland districts, after disposing of and cutting out the timber, the arms or boughs of the trees are cut up into posts, rails, and cord-wood for charcoal; the *spray* being mostly made up into faggots.

The relative value of different sorts of timber may be said to depend almost wholly upon local circumstances, as those of contiguity and facility of being taken to the places where they are the most largely made use of, or where only employed. Some sorts are, however, every where valuable on account of either their general application, or their scarcity, such as the oak, the ash, the elm, the beech, and the still more valuable larch, and others of the first description: and of the latter, the common chestnut, the yew, the box, and the holly. The light products of different kinds, afforded by some timber-trees, are also of great use and value in most places.

Hunter, in his "Evelyn's Sylva," has justly remarked, that every person who can measure timber, thinks himself qualified to value standing trees; but that such men are often deceived in their estimates. That it is the perfect knowledge of the application of the different shaped trees that enables a man to be correct in such valuations. That a foot of wood may be of little importance to one trade, but of great value to another. This is the grand secret, it is thought, which enriches the purchasers of standing timber.

On the whole, the great and constant demand for timber, on account of the increasing scarcity of it, should induce the proprietors of lands which are proper and suitable for it, to attend as much as possible to the raising and providing of this great object of rural economy, and national as well as individual wealth.

*TIMBER, Hardening of.* See *HARDENING of Timber*, and *Seasoning of TIMBER*.

*TIMBER, Seasoning of*, a term used to express the preparing of timber after it is felled, for cutting and working up for use.

As soon as felled, it should be laid up in some dry airy place, but out of the reach of too much wind or sun, which, when in excess, will subject it to crack and fly. It is not to be set upright, but laid along, one tree upon another, only with some short blocks between, to give it the better airing, and prevent its becoming mouldy, which will rot the surface, and produce mushrooms on it. Some persons daub the trees all over with cow-dung, which occasions their drying equally, and prevents their cracking, as they are otherwise very apt to do.

Some recommend the burying of timber in the earth, as the best of all ways of seasoning it; and others have found it a fine preservative to bury their timber under the wheat in their granaries; but this cannot be made a general practice.

In Norway, they season their *deal* planks, by laying them

in salt-water for three or four days, when new sawed, and then drying them in the sun; this is found a great advantage to them; but neither this, nor any thing else, can prevent their shrinking. And it has been recommended to lay boards, planks, &c. in some pool or running stream for a few days, to extract the sap from them, and afterwards to dry them in the sun or air; by this means, it is said, they will be preserved from chopping, casting, or cleaving: but against shrinking there is no remedy. Mr. Evelyn particularly recommends this method for fir. See *HARDENING of Timber*.

The seasoning of timber by fire is the best way of all, for piles and other pieces that are to stand under the earth, or water. The Venetians first found out this method, and the way by which they do it is this: they put the piece to be seasoned into a strong and violent flame; in this they continually turn it round by means of an engine, and take it out when it is every way covered with a black coaly crust; by this means the internal part of the wood is so hardened, that neither earth nor water can damage it for a long time afterwards. This method is practised in many places for seasoning the posts for paling of parks, &c. and has this to recommend it, that in the very oldest ruins we have ever been acquainted with, there have been discovered many times pieces of charcoal, all of which have been found uninjured, though buried in the earth for ever so many ages. This method of charring timber is practised in many parts of England, and has been much recommended, both as to economy and effect.

For this purpose, all that is necessary is to light a fire upon the ground, which shall be surrounded with a wall built with loose bricks or stones, and then, when the pieces of timber are laid across the walls, to turn them round carefully so as to present every part to the action of the fire in succession; and when the whole surface, to the depth of three quarters of an inch or an inch, is converted to charcoal, they will be sufficiently prepared. While burning, they should have a temporary covering of boughs or other fuel to preserve them from the action of the atmosphere, which would be apt to convert part of the wood into ashes. See Parkes's *Essays*, vol. ii. See also *CHARRING of Posts*.

An ingenious friend of the editor objects to this practice. The opinion that *paint* is a preservative of wood is almost universal. Nevertheless, we shall shew it to be not only erroneous, but that in most cases the use of paint accelerates the destruction of every species of wood to which it is applied.

The decay of wood is occasioned by *internal*, not external moisture, and this only when it becomes stagnant. As long as there is a free circulation, no decay takes place. Stop the circulation, and if there be any moisture whatever in the wood, stagnation commences, putrefaction ensues, and the destruction will proceed with an activity in proportion to the quantity and close confinement of the internal moisture. When wood is thoroughly painted on every side, it is evident that the moisture within it is completely *sealed up*, and which necessarily becoming stagnant, the decomposition and decay of the timber immediately commence. Hence it is clear, that painting of wood, as above stated, in every case, except only when it is entirely free from moisture, or as it is called *thoroughly seasoned*, must be as effectual a method as any that can be devised for accelerating its decay.

Wood that is painted only on one side, will, *ceteris paribus*, last as long again as that which is painted on both sides. And that which is not painted at all will be most durable. Experiment will prove this to be the fact, whether the wood is exposed to the weather or not.

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It is seldom that we meet with either a scaffold-pole or a scaffold-board (such as are used by builders) that is rotten, although they are of fir, and are alternately wet and dry, and descend from father to son for several generations. The reason is, *they are never painted.*

Examine any old building, and it will be found that no part of the wood or timber is in a sound state, excepting that which has escaped the painter's brush. The wainscot, doors, windows, &c. will be found to be rotten, when the floors and stairs, although alternately wet and dry from periodical washing, are perfectly sound, *because* they have never been painted.

It is a common practice in London to cover the basement floors with painted oil-cloth; and it is astonishing to see how soon, in these cases, the floors are rotten, and which is called the dry rot, but which is never once suspected to be the stoppage of circulation by the use of the oil-cloth. Were carpets substituted for the painted cloths, no such effect would take place.

The dry rot in buildings, and particularly in the *navy*, is comparatively a modern disease, and has very much increased since the pernicious practice of painting has become so general. The ancient city of Chester, where so much timber was introduced into the outsidings of the buildings, and which is now black with age, but never painted, is a striking illustration of this theory. The same may be remarked of the villages at a distance from the metropolis, where the outside wood-work of the buildings, such as doors, windows, window-shutters, weather-boarding, &c. which have never been painted, are nevertheless found, and yet some of them so ancient as to defy all enquiry as to their age. How different this from the gentlemen's houses near London or other great towns, where the gates, posts, rails, and pallisades are kept constantly *well painted*, but are seldom found to last longer than ten or a dozen years at most!

Paint indeed conceals from the eye the destruction which it occasions; and our readers will doubtless by this time begin to suspect their former opinions of it to be erroneous. We shall therefore only mention two other instances, which came under our own observation, to shew that wood never ought to be painted, except for the purpose of ornament.

A few years ago, some old houses were pulled down near the Monument in London. Several of the principal timbers were so scorched and burnt on the outside, that an enquiry took place as to the cause of it; and it was clearly ascertained, that the timbers in question must have been preserved from the ruins of the great fire of London in 1666, so that this wood must now be much more than 150 years old; yet the writer of this article lately saw that same fir-timber sawed out into deals, and again used as new stuff, being to all appearance as found as ever. The only perceptible difference was in the colour, which was darker than deals generally are.

The other instance referred to is the late old Jewry chapel in London. When that building was taken down, the pews, which were of oak, and the seats, which were deal (but never had been painted) were found to be in so perfect a state of soundness, that they were removed to the new building in Jewin-street, and where there is no doubt they will remain as long as the building itself, although those said deal seats are known to be considerably more than one hundred years old.

The most effectual method of preserving timber from decay is to char it; but when the purpose to which it is to be applied will not admit of that operation, the next best

method is to wash it over with charcoal and water, similar to white-washing. Either of these methods will certainly preserve it from the dry rot, charcoal being the greatest antiputrescent known, and no moisture within the influence of its action will become putrid or decomposed, and we have already shewn that this must take place before wood will perish. It may be further observed, that vegetation cannot take place where charcoal or charring is used, and the dry rot is always accompanied with that species of vegetation called *fungi*, and this fungus never occurs till decomposition or decay has begun.

When boarded floors are to be laid upon or very near the ground, it should be strewed over with dry ashes, and the joists and underside of the boards either charred or payed over with charcoal-wash, as before directed. The same should be done with the side of the wainscot next the walls.

As painting is indispensable from the fashion of the times, to doors, window-shutters, wainscot, &c. it would be well to have them painted once over in the carpenter's shop when the stuff is perfectly dry, and finished afterward in the building for which they are prepared.

If the best seasoned stuff be put up *unpainted* in a new building, the quantity of moisture it will imbibe from the brick-work, plaster, &c. before it can be painted, will defeat all former care of well seasoning.

As to fashies, mahogany is unquestionably the cheapest article they can be made of; for deal, when painted only a few times, will have cost more than the difference of price of that very superior wood, both as to look and durability. Air that is stagnant is equally pernicious as stagnant moisture. When it is in that state, it soon becomes decomposed, and the hydrogen gas fixing upon wood, ropes, paper, and other vegetable substances, quickly brings on their destruction. Ventilation, and the use of charcoal, are the best preventives.

The above hints will be sufficient to guide the intelligent workman in all other cases.

Though it does not properly belong to this article, it may not be amiss to mention, that these observations are quite inapplicable to the preservation of iron. Iron decays from the effect of *external* moisture, and the action of the atmosphere upon its surface, which produces oxydation, and which is the sole cause of its decay. This is only to be prevented *by painting.*

*TIMBER, Preserving of.* When boards, &c. are dried, seasoned, and fixed in their places, care is to be taken to defend and preserve them; to which the smearing of them with linseed-oil, tar, or the like oleaginous matter, contributes very much.

The ancients advise the smoke-drying of all instruments made of wood, by hanging them up in the chimnies where wood-fires are used. The whole benefit arising from this seems to be, that the oil of the burnt wood enters, as it ascends in the smoke, into the pores of that which is proposed to be preserved.

The Dutch preserve their gates, portcullices, draw-bridges, sluices, &c. by coating them over with a mixture of pitch and tar, on which they strew small pieces of cockle and other shells, beaten almost to powder, and mixed with sea-sand, which encrusts and arms them wonderfully against all assaults of wind and weather.

Timber felled before the sap is perfectly at rest, is very subject to the worms; to prevent or cure which, Mr. Evelyn gives us the following secret, as most approved: Put common sulphur into a cucurbit, with as much aquafortis

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as will cover it three fingers deep; distil it to a dryness, and let it have two or three rectifications.

Lay the sulphur remaining at bottom on a marble, or in a glass, and, with the oil it dissolves into, anoint the timber.

This, he adds, not only infallibly prevents or cures the worminess, but preserves all kinds of woods, and even many other things, as ropes, nets, and masts, from putrefaction, either in air, water, or snow.

For such as would go a shorter way to work, two or three anointings with linseed-oil may do very well.

As to the chaps, or clefts, green timber is liable to after working, and which is a very great defect in many fine buildings, they are closed by anointing, suppling, and foaking it with the fat of beef-broth, twice or thrice repeated.—Some carpenters use grease and saw-dust mingled for the same purpose. But the former method is excellent. Mortimer's Husbandry, vol. ii. p. 104.

TIMBER, *Strength of.* See STRENGTH of Materials, and BEAM.

TIMBER, *Crooked, Growth of,* the means of raising and providing bent or twisted timber of different sorts for the purpose of ship-building and many other uses. It has been noticed by Mr. Loudon, that the form of the larch timber-tree is unsuitable for some of the purposes of naval architecture; and that to render it more proper and suitable for such uses, cutting or pruning it has been advised by some; and, what is still less practicable, shading it, by others: but that when its mode of growth is well considered, it will be found that neither of these methods would prove effectual. The former could not succeed, it is supposed, because in the larch and fir-tribe one stem constantly takes the lead; and that in this stem alone is contained the timber. The latter, or shade, might, it is thought, produce a crooked enough stem; but that in regard to strength, or timber produce, it would evidently be so deficient, as to be totally unfit for naval architecture. In consequence of which, he has recommended the plan of bending the young trees as preferable to every other practice; and as this mode may, at some future period, perhaps be deemed of public importance, he has given a few remarks concerning the method that should be adopted and employed in the business.

It is said that, in the first place, supposing a timber plantation or wood to be planted in regular rows, fifteen feet apart, and the same distance in the row; and grown from fifteen to twenty years; in bending or rendering the trees crooked, begin with the first row, and let every other tree be bent down in different degrees, and tied to the intermediate ones which remain erect, or be fastened to the ground. After the trees have had the growth of seven or eight years longer in that situation or position, they may be bent backwards, so as to have somewhat the form of the letter S, the tops or leading shoots rising directly upwards again from the upper bends, and the bent trees be either tied to themselves between the bent parts, to keep them in their proper bent positions, or to the trees on the sides, or to any of the trees which surround them, as may be found to be most convenient and necessary. When the ropes have held the trees in these situations or positions for a few more years, they will have received, and retained, in some measure, the above crooked appearance; which is a form that will afford knee and other pieces, which are of great use in ship-building, and which always, it is said, bear a higher price than any other form of even oak-timber. Some trees need, however, it is thought, only be bent gently on one side, and others a little more so. This variation in the inclination of the trees, with those which should be left erect,

would, it is supposed, serve to produce and afford proper shelter for the whole timber plantations to which they might belong, according to the uses or purposes for which they are intended, or to the form which is most in demand. This plan is certainly thought worthy of a trial; and there is no great reason to doubt its success; for the practice of bending trees is not new; as it was advised by Evelyn, and practised by the Romans in Virgil's time.

It is probable, too, that some other sorts of timber-trees may be grown in this way with advantage.

It is suggested, that in planting the larch for this, or any other purpose, a careful attention should be had to the choice of a proper soil, as when the tree is in one which is not too rich, it reaches a large size, and soon arrives at maturity; and that it is obvious, that if the above method were adopted, the timber would be fit for building the largest ships fifty years after it was planted, and for building smaller vessels much sooner. And that there is abundant evidence, that it would grow to a sufficient size for this use in all the mountainous parts of the island; moreover, that the experiments which have been made by Mr. Knight, on the sap and wood of trees, as well as common observation, prove, that the circumstance of bending, especially in an open exposure, would produce a much thicker trunk and a larger quantity of timber, in a given time, than a straight tree. These circumstances, in connection with the valuable qualities of this tree as ship-timber, and the growing scarcity of that article in this country, lead the writer to suggest the propriety of devoting some extent of the national forests to the cultivation and raising of the larch as timber, either bent in different ways, or even allowed to take its natural form; as the first cost of planting and fencing in, even for five hundred acres, would not exceed 1000*l.*, and the yearly expences afterwards would be but a mere trifle. The culture of the oak, and perhaps some other timber-trees, should not, however, be neglected in the smallest degree: but when it is considered that this tree takes two or three hundred years to come to perfection, and the larch not above half a century, reflecting at the same time on the approaching scarcity of oak-timber fit for the navy, these hints and remarks may not, it is thought, be unworthy of the attention of the legislature, or from other quarters. See TIMBER and TREE.

The excellent properties of larch-timber, for the use of the navy, have been noticed by many, as those of resisting different dangerous effects. Anderson, in his Catalogue of Trees, asserts, it is said, that it does not fly in splinters by the impulse of a ball in an engagement; that no force of heat makes it flame; but that when thrown into a strong fire it consumes imperceptibly. How many accidents then, it is asked, might be prevented by a greater use of this timber, if applied in ships? Many lives are lost by the splinters of oak in naval warfare: all these would be saved to the state by having the planks of war-ships made of it. Decks of the same materials would resist fire, either accidental or designed; for although burning materials in time will force their way through a plank of larch, yet it never would spread to the adjoining plank. To be in a ship on fire at sea, is certainly, it is said, the most dreadful situation in which any person can be placed; every exertion, therefore, to prevent such calamity, is the duty of all well-wishers of their country. Beside these advantages arising from the use of the larch as timber, there is another of no small importance to a warlike and commercial nation, the saving of expence in ship-building; as by experience it is found that it lasts longer than oak under water, and worms will not touch it. Sailors are said indeed to put larch chips among their clothes; which are found by experience to prevent

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vermin, mould, &c. Consequently, in place of renewing ships of war every twenty or thirty years, their existence may, it is thought, be lengthened to thrice that time.

Many other interesting circumstances and facts in support of these statements may also be met with in Newton's Vitruvius, which we have not room to admit in this place.

**TIMBER, Age of the Growth of,** the limit to the growth and increase of wood in trees of this sort. It has been remarked by a late writer, that from the old alburnum of such trees being gradually converted into heart-wood, and being continually pressed upon by the expansive force of the new fibres, it becomes harder, denser, and at length loses altogether its vascular structure; and in a certain time obeying the common laws of dead matter, decays, decomposes, and is converted into aeriform and carbonic elements; into those principles from which it was originally formed. The decay of the heart-wood would consequently seem to constitute the great limit to the age and size of timber or trees of that kind. This is more liable to take place in some cases than in others. The age of growth in timber-trees is, however, mostly ascertained by the rings or layers of which they are formed.

In regard to the age of the growth of the oak, the writer of the rural economy of the midland counties has remarked, that there has been lately a fall of timber in the woods there, including some large timber-trees. That he counted the rings of one which was found at the butt: the number, as nearly as he could ascertain it, was two hundred. But those of the last forty or fifty years' growth were so thin, he could not count them with certainty; though with sufficient accuracy upon which to ground the calculations given below. The girth of this tree, in the girding place, was nine feet, the diameter of which was something more than thirty-four inches. And the estimated growth, in this part, was thirty inches diameter during the first hundred and fifty years, and four inches (two inches thick) in the last fifty years. The length of the stem was twenty-two feet. The contents of the whole were one hundred and ten feet of timber. Those of the first hundred and fifty years' growth, eighty-five feet; leaving twenty-five feet for the growth of the last fifty years. It is therefore observed, that although the increase of diameter had been comparatively small during the last fifty years, the increase of timber had been nearly as great as in the first stages.

But supposing, it is said, that this tree had been taken down at one hundred and fifty years old, it would, at 2s. a foot, have produced 8*l.* 10*s.*, the interest of which would have amounted, in the course of fifty years, to more than 20*l.*; beside the use of the land during that time: whereas the tree, at that rate, is now worth only 1*l.* These calculations and inferences are not, however, it is said, intended to excite a spirit of felling timber prematurely, or at too early an age, a spirit which is already too prevalent; but to endeavour to decide on the most proper age of growth for its being cut down; it being an incontrovertible fact, that, in point of utility, public and private, the fault of suffering timber to stand to too great an age, is infinitely greater than that of cutting it down before it has attained its full growth or age. In the latter case, it is said, there is no waste; the interest of money, and the succeeding shoots, or the use of the land, stand against the loss of growth of timber. But, in the former, the principal, interest, after-wood, and the use of the land, are all thrown away: so that the community, as well as the proprietors, are losers by the management. In the one case, cutting part before it be fit, may save other trees which are more fully grown; but, in the other, the whole is lost. Leaving, it is said, the pre-

servation and management of ship-timber to those to whom it properly belongs, it does not follow that, because it is wrong to suffer timber to stand to waste, it is right to take it down before it be of a proper age, or sufficiently grown, for the purpose of ship-building. It is not over-grown, but stout-growing timber which is fit for that use. Timber is seldom cut down prematurely, or at too early an age, but by the necessitous; or by those who have only a temporary possession in their respective estates. And what argument, it is asked, can prevail with this class of proprietors? Another class, and it is trusted by much the largest, is composed of those who, considering their timber merely as a profitable part of their several estates, take it down whenever it becomes full-grown, and a fair opportunity offers. And a third class of this sort of proprietors consists of those who, through false pride, false fear, or false economy, suffer their timber to stand until it be over-grown: and if the writer have any other motive for making known the above minutes on the ages of timber-trees, than that of recording facts, it is the desire of placing in its proper light, the improvident management of this class of timber proprietors; and, at the same time, to endeavour to form just ideas of a subject, which has not, hitherto, been brought before the public; but which is pre-eminently entitled to public notice and discussion.

It is additionally stated, that this matter having been rendered, in a considerable degree, familiar to the writer by many years' observation and practice, he may here set down what appears to him the proper ages of growth for cutting down the four following species or sorts of timber.

1. Poplar, from thirty to fifty years old.
2. Elm, from fifty to a hundred.
3. Ash, from fifty to a hundred.
4. Oak, from one to two hundred.

But it is said that it very much depends on situation, and on the soil and subsoil in which timber-trees are rooted. On dry absorbent soils, the oak and the elm, at least, are observed to go off much sooner than in cooler more retentive situations. And in a wood, on a dry loam, with a rocky subsoil, the oak was found going fast to decay at two hundred years old; while in another, in a cooler situation, it was found, but unprofitable, at that age; and in a third, perhaps a still cooler spot, it was found, profitable, and wearing every appearance of being in a fit state of growth for being taken down at the age of a hundred and fifty years. These three woods were those of Merevale, Bagot-park, and Statfold, in the midland districts of this country.

A full knowledge of the age of growth in timber-trees is a matter of great utility and advantage to the proprietors of wooded lands.

**TIMBER, Marking of,** the putting of such marks upon timber-trees, or large falls of timber, as may be necessary to distinguish them in felling, and which are of a proper age and growth for being taken down. It is usually performed by means of an instrument of the compasses kind, by which a circle, with a number, or some other particular sort of mark, is formed on the tree. It is of great use and advantage in felling and disposing of timber, to have this business executed in a careful and judicious manner. See **TIMBER.**

**TIMBER, Measuring of.** See **MENSURATION** and **SLIDING-RULE.**

*For finding the area of a board or plank,* the rule is simple and easy; which is that of multiplying the length by the mean breadth. If the board is tapering, the breadths at the two ends should be added together, and half the sum will be the mean breadth. The method by the sliding-rule is too obvious to need being mentioned.

## TIMBER.

**TIMBER-Carriage**, that sort of wheel-carriage which is contrived and constructed for the purpose of conveying heavy and other timber. Carriages for this use are formed in a strong firm manner, but in different methods, according to circumstances, and the nature of the timber to be drawn. They are sometimes made with four wheels, but much more frequently only with two. They have occasionally shafts too, but are more often constructed with a pole merely.

These carriages, the writer of the rural economy of Norfolk remarks, are in that district, as in most other places, of two kinds; the four-wheeled sort of carriage, provincially "*a drag*;" and the pair of wheels, provincially "*a gill*." The last is most in use. The construction of the gill of this county is, it is said, similar to that of the timber-wheels of most other counties; namely, a pair of tall wheels, with a crooked axle-tree, surmounted by a block; to which axle is fixed a pair of shafts, or sometimes a single pole only. But it is noticed, that the method of using them there, is different from that which has been observed in other places; where the only use they are put to is to raise the butt-end of a large timber to be drawn a short distance; the top-end being suffered to drag behind upon the ground, to the great injury of the turf, or the road upon which it is drawn.

In the above county, however, a large stick of timber, or perhaps three or four smaller ones, are, it is observed, entirely slung to the axle; so that, in drawing, no part of them whatever touches the ground; the top-end or part being generally drawn foremost, and the end towards the horses always the heaviest.

It is stated, that the method of taking up a piece of timber is this: the horses being taken off, the wheels are run, by hand, astride the timber to be slung, until the axle is judged to be a few inches behind the balance-point: or, which is better, a chain is first put round the timber, and the wheels run up to it. It is difficult to ascertain the exact place of fixing the chain by the eye; but nevertheless, a person accustomed to sling timber in this manner, will, it is said, come very near the truth. The chain hooked, and the axle brought into its proper situation, the shafts, or pole, are thrown back in the usual manner; the chain carried over the block, brought round the pole, its ends made fast, and the shafts or pole brought down again by the horses; by which means the timber is lifted from the ground, and suspended to the axle. If the required point of balance be not hit upon at the first trial, the shafts are suffered to rise again, the chain is unhooked, and shifted to its proper situation: the shafts being then again pulled down, are bound by an iron trace, or small chain, close down to the timber; while another small chain or trace is fastened round the foremost end to hook the horses to; the team drawing by the timber, and not by the pole or shafts.

It is supposed, that the utility of having a super-balance of weight forward is two-fold: if the piece were slung in exact equilibrium, it would, upon the road, be in perpetual vibration; thereby rendering the pull unsteady, and extremely inconvenient to the horses: whereas, by throwing the balance forward, the traces are commonly kept down constantly in their proper place, and the pull becomes uniform: if, however, too much weight were to be thrown forward, the draught of the horses would not raise the point of the timber from the ground; the friction would, of course, increase the draught, and the road be at the same time hurt. It therefore follows, it is said, that the proper weight to be thrown forward is such as is enough to prevent a vibration, but not so much as to prevent the point from being raised from the road by the draught of the horses

upon level ground. And that the other advantage, by a super-balance forward, is gained in going down a hill; in which case, the draught not being wanted, the point, of course, falls to the ground, and serves as a pall to regulate the motion of the carriage: if the super-balance alone be not sufficient to check the too great rapidity of the motion, the driver adds, it is said, his own weight. Likewise, if, in ascending a hill, the balance be lost; he, in like manner, seats himself upon the fore-part of the load, thereby keeping it down to its proper level.

It is added, that this method of conveying timber may, it is possible, be in use in other districts; but the writer has not seen it practised any where except in the above county: and that it is known to be an excellent, but not a common mode of practice.

It is of great utility and convenience for timber proprietors and dealers to be always provided with good carriages of this sort.

**TIMBER Hedge-Row**, such trees of this kind as are raised and grown in the lines and rows of the hedges. It has been long a disputed point among the writers on agriculture, and which is not yet fully decided, whether it be admissible or not to have trees of this sort in the directions of the hedge-rows: some strongly contending for its utility, on the grounds of the shelter, shade, and timber afforded by the practice; while others as strongly oppose it, on the score of the injury which it does to the crops and the hedges underneath the trees, as well as the obstruction which it affords in working the land, when in the tillage state. However, in many situations and cases, there can be no doubt of the advantage of having timber-trees of the hedge-row kind, when under proper and suitable management.

It has been well observed by an able writer on the means of improving the rural objects and practices of the country, that although a few trees growing in a hedge, when considered singly, may have little effect, and be of no great value or consequence; yet that a number of hedge-rows, all properly interperfed with timber-trees, will completely change the appearance of a hilly country or district, improve its climate, and yield a considerable quantity of timber to the owners of the lands. The consideration of the matter must, of course, it is thought, be of great importance to the landed interest of some parts of the island, especially those in the more northern or mountainous districts of the kingdom. What is necessary to be said on this subject here, may consequently be introduced under the heads of the *nature* of the *lands* where timber of the hedge-row kind may be raised and grown without *injury* to the farmer; and the *species* or sort of trees which is most proper to be raised in such cases. In regard to the *interest* of the farmer, the lands which are the most evidently and suitably adapted for the growth of hedge-row timber-trees are all those which are naked and much exposed, and which are kept for the most part under pasturage; and in so far as the beauty of a country or district, the improvement of its climate, and the health of its inhabitants, are concerned, the hedge-rows of the rising-grounds alone should be occupied by trees, except a few in the vallies, by the sides of public roads or rivers, to form fore-grounds to the rest of the country or district; and a few near houses or villages to group with them, and afford a richness to their appearance. In low rich vallies between mountains, which are kept in perpetual aration, the hedge-rows should not be taken up by timber-trees of this sort. But a country or district wholly level, as many of the counties and districts in the southern parts of the kingdom are, may sometimes have the hedge-rows partially set with trees, without doing any great injury to the farmer;

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farmer; while, if properly managed, it may vary the country, and improve its climate. In such levels, the hedges should, however, be kept very low, and the trees be trained erect with single stems, and few lateral arms or boughs near the surface; or, as is done in some places, the width of an ordinary ridge may be left on each side of the hedge, to be kept in perpetual pasture, which prevents the corn from being so much injured by the trees, and is a great ornament to a farm. This last mode is, however, not without its disadvantages, as it is liable to disseminate and fill the adjoining tillage-lands with the seeds of noxious and hurtful weeds. However, in cases where the whole farm is to be kept in perpetual pasture, the trees may often be allowed to extend their branches, and the hedges may be kept high or low, at pleasure. Moist or clayey soils should never, when under perpetual aration, be set with hedge-row trees; and indeed, before they are put into such rows any where, or in any case, a full consideration and estimate should, it is said, be made of their effect on the annual rent of the land, on their intrinsic value, on the climate, and on the appearance of the country.

The writer of the Yorkshire rural economy considers this an interesting subject to the proprietors of inclosed estates. The old inclosed parts of that neighbourhood, when seen at some distance, have, it is said, the appearance of woodlands; the inclosures being mostly narrow, and full of hedge-row timber. The age, on a par, is about 50 years. In half a century more, the value of the timber of some parts of it, if suffered to stand, will probably be equal to the value of the land; a circumstance, it is supposed, of no small import to the owner. But the detriment to the occupier requires to be considered. In this county, it seems, it is said, to be a general idea, founded perhaps on experience, that lofty hedge-rows are beneficial to grass-land; increasing its productiveness by their warmth, and giving shelter and shade to pasturing-stock. The roots even of the ash are considered as inoffensive to land in the state of grass; in which state the grounds, thus loaded with hedges and timber-trees, are almost universally kept. Indeed it would be impossible, in their present state, to occupy them as arable land. They are entire inclosures, every foot of the areas of which must necessarily be occupied by ashen roots; nevertheless they give an ample supply of hay and pasturage; one to two tons of hay an acre: and, in many of them, three acres will afford sufficient pasturage for two cows of the largest size. The rent from thirty to forty shillings an acre. Strong evidence this, it is said, that the roots of the ash are not very hurtful to grass-land.

It is evident, however, it is thought, that the oak, when suffered to thrust its low spreading head into the inclosure, is injurious to the herbage beneath it; that the leaves of the ash are very detrimental to after-grass; and that the hedges are annually receiving irreparable damage: no general plan of training up the trees with tall stems having, it is believed, in any instance, been adopted, so as to prevent, in any complete manner, such effects.

On these accounts it is concluded, that the advantages accruing from the planting of timber-trees in the hedge-rows of inclosed common fields, of a foil and lying in a situation adapted to grass, are far superior to any disadvantages arising therefrom, even where they have been suffered to grow in a state of almost total neglect. And that land which has lain open, and which has been kept in a state of aration during a succession of ages, is equally productive of grass and trees. That it is generally good management to let it lie in grass for some length of time, after inclosure. Besides, that in the above neighbourhood, it is evident to

common observation, that trees flourish with unusual vigour in newly-inclosed lands of arable fields; and that their injury to grass-land is inconsiderable, when compared with the value of the timber which they produce. The low spreading heads of the oak, and the leaves of the ash, appear to be the chief inconveniencies of these two sorts of trees to grass-land.

But as an alternancy of corn and grass is, it is thought, generally eligible on lands which our ancestors have made choice of for common fields; and as the roots of the ash are not only obstructions to the plough, but the general nature of the plants is, in a singular degree, inimical to corn; it is consequently necessary to eradicate the ash from the hedge-rows, before the land be again broken up for arable; or to preclude this tedious operation, in the first instance, by planting oak in its stead. It is conceived that the head of the oak may be raised to such a height, as not to be injurious to grass, nor to the hedge, while yet in a youthful state, even though it were suffered to run up to its natural height.

The roots of the fir tribe of trees afford equal obstruction to the plough; they are, of course, equally objectionable in the hedge-rows of arable fields.

It is suggested, in conclusion, that whenever the inclosures are broken up for corn, the hedges should, in common good management, be headed down, and kept in a dwarfish state; in which case, tall stemmed oaks would be a valuable source of timber, without being, in almost any degree, injurious either to the hedges, or to the corn growing under them. But the training of young oaks, and the general management of hedge-row timber, cannot, with any degree of prudence, be left to a mere occupier. When intended as nurseries of timber, they should, it is conceived, be under the immediate direction and management of a person proper for the purpose. See POLLARD and FENCE.

The writer of the Gloucester Report on Agriculture, however, remarks, that the practice of planting timber-trees at all in hedges is liable to objections; for if the tree be left to take its natural growth, which is the best mode of raising it for good timber, the lower fence is ruined by its shade and drippings; or if they are cut up and shredded into naked poles, or pollarded for the sake of the top or fire-wood, the timber is injured, and the beauty of the tree destroyed. A better plan is, it is thought, to assign certain spots on estates for the purpose of raising timber-trees only. This would eventually be no waste of land, because the grass or corn growing near the hedges, which are filled with timber or fruit-trees, is worth little or nothing. In the small inclosures at the angles of a field, for instance, the trees might take their natural growth; and this would be more rapid, in consequence of their being planted in clumps, and protected. If, however, the old mode of planting in hedge-rows should be continued, the ash may be the best for the purpose. The timber, in some respects, is superior to elm, and, in various cases, useful where that cannot be applied. In durability it almost rivals the oak, and its growth is improved by being kept to a single stem, the only mode of treatment in which trees should be admitted into hedge-rows at all, but which few other trees will bear. The oak and beech particularly, when so large as to become heart-wood, appear to be greatly hurt by the loss of their side branches; the immediate effect of which is a retardation of growth; and it is said, that the oak will not thrive for ten years after this operation; and of the elm, that it is injured, though apparently suffering less. It is, however, to be noticed, that the finest and soundest trees are those which have been most left to their natural growth.

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In what relates to the most proper sorts of trees for putting in hedge-rows, in different cases, it may be further noticed, that when the soil is good and deep, according to the first of the above writers, the oak and Scotch elm may be the most suitable; in strong land, the ash; in poor soils, the beech, sycamore, and birch; in cases of moist soils, as meadows and such like places, the Lombardy poplar, which, besides its timber produce, forms, when in rows, a close, erect, narrow hedge, fifty or sixty feet high, in a few years. Such hedges are, however, of no very great value, whether the trees be cut low, or allowed to rise to their full height. The oak and the above sort of elm prosper better, it is said, in hedge-rows than in any other situations; their roots have a free range in the adjoining inclosures, while their tops shoot out vigorously on every side, thus often producing excellent ship-timber. More remarks of this nature may be met with in Kent's hints, and Marshal's work on planting. The beech, it is thought, is peculiarly suited for thin soils and exposed situations. When put out about ten or twelve feet asunder, it affords excellent shelter, and, at the same time, a very considerable quantity of timber. The ash and the sycamore will rise and grow erect on the most exposed upland situations, or near the sea. When put out in good soils, they should generally be trained to one stem; in which state, their timber produce is the most valuable and useful. The resinous tribe and the evergreen sorts of trees are, for the most part, improper for being set out in hedge-rows. In the different cyder districts or counties in the southern parts of the kingdom, fruit-trees are not unfrequently introduced into the hedge-rows; the practice of which might probably be advantageously had recourse to in many other districts and counties in the same part of the country, as well as in several more to the north. In many different situations they would be a valuable acquisition, without doing any injury, or taking up the more useful part of the land.

In a great number of districts and places where hedge-row timber exists, the situation is often improper, and the management wretchedly bad and negligent; in consequence of which, it has frequently become an injury to the farmer, without yielding any advantage to the proprietor. Two more glaring instances of this cannot, it is thought, be given than in the tall naked elms, and pollarded oaks, which prevail in many places in the southern parts of the island: the former, by improper lopping and cutting, are worth nothing; and the latter, by being cut over at the height of eight or ten feet, form ugly bushy-headed trees, which do great injury and mischief to the farmer, and yield nothing to the owner. In defence of such practices, it has been said, that fuel alone is the intended produce; but certainly it would be much the best method, in such cases, it is thought, to allot a space or portion by itself for the purpose of raising fuel, and devote the hedge-rows to the more important uses of producing timber. The fuel part of the land might be rented by the farmer, and the hedge-rows belong exclusively to the proprietor. Keeping each sort of woody collection strictly characteristic of its kind is, it is thought, as beneficial in the raising of trees, as the division of labour is in political economy. There is a great number of situations and places in the more northern parts of the island, as well perhaps as in some others, where hedge-row timber might be cultivated to the advantage of both the landlord and tenant, and the great ornament of the country. Suppose, it is said, an estate of two thousand acres, divided into fields of ten acres each, and the hedge-rows planted with trees at fifteen feet apart; this would be above the rate of eight trees upon the acre, or sixteen thousand trees

in the hedges only. At the end of thirty years, if well managed, they would be worth from twenty to forty shillings each; but say only thirty shillings each, this would be sixteen thousand pounds: a very considerable sum, it is said, for a proprietor of only two thousand acres to receive every thirty years, above the annual rent of his estate.

These hints and observations place the utility and importance of hedge-row planting, where it can be done with propriety, in a striking point of view.

*TIMBER-Inspector*, a term applied to a person who is appointed to inspect and examine the states of timber-woods, plantations, and forests in any district or place. It has been suggested by the writer of the corrected account of the state of agriculture in the county of Devon, that, as it is evident that the timber in that county is wasting in a very alarming manner, (and the same is the case in many other timber-wooded districts,) it is necessary that an ordinance should be made, that in future no timber-tree should be cut down, or legally exposed for sale, without having the mark of the timber-inspector of the district affixed to it, and a certificate accompanying it. This sort of officer should, it is thought, be appointed and paid by government, and to whom annual returns should be made of all matters and circumstances appertaining to his duty, which should also extend to the inspection and examination of all young timber-plantations, &c.: where it should be required that he should not only see that a certain number of young trees is planted for every timber-tree that is cut down, but that the same young trees and plantations are well fenced in and protected. That on his observing such timber woodland fences insufficient for their safety, and their owners persistently unmindful of the report he has made, he should be empowered to order and direct the necessary repairs to be done, and to be enabled to recover the amount of such expence, by levying an immediate distress upon the moveables on the premises of the parties.

It would unquestionably be of great utility and advantage in increasing the quantity, and improving the quality of timber, to have such inspectors in all timber-wooded districts of every description.

*TIMBER-Plantation*, that sort which is made simply for the purpose of raising and producing timber. Several points and circumstances are necessary to be attended to in the performance of this business, in order to render such plantations the most expeditiously and abundantly productive, such as the proper choice of soil, situation, and exposure, as well as proper fencing in, thinning, training, and pruning, all of which are noticed and explained under their appropriate heads. See *PLANTATION, PLANTING, PRUNING, THINNING, TIMBER, &c.*

*TIMBER-Repairs*, such as are done by some sort of timber, to be cut down on estates, &c. Rough timber is mostly allowed for repairs to be done by tenants, and it is commonly the custom of this country to permit the top-wood of the trees to be taken by them for their trouble and expences in various ways with such timber. In some cases, however, the contrary mode takes place, such top-wood being charged to them at a moderate rate or price. And, in all cases, it is thought by the writer of the work on "Landed Property," that the tenant should be charged for the bark of oak-timber, which is now become scarce and of great value, he being allowed for peeling and for carriage to market, or other places.

It is advised that the neat value of the bark and the top-wood, where it is charged in these cases of repairs, should be made a fair estimate of when the timber is marked, and charged to tenants in a sum certain. By this means they become,

come, it is thought, interested in the peeling and harvesting or securing of the bark: no waste is consequently incurred through their neglect, or any unfair dealings risked; nor is there any disputable account to be settled, on the rent-day, between them and the receivers.

In the view too of enabling the acting managers, in such cases, to *select*, in the best and readiest manner, *proper* trees for the several different sorts of repairs that may, from time to time, be required, — let, it is said, the woodmen, or those who have the immediate charge of the timber of estates, be directed to note down, in going their rounds, such trees as may be faulty, and are likely to go soon to decay, or which are stinted in their growth, or too much crowded, and, in general, such as are proper to be taken down for the different uses of estates: whether for erecting or repairing buildings, or for gates or other purposes: in order that they may be able to lead or direct, without loss of time, the acting managers and the carpenters or builders of estates, with the estimates, in their hands, of the quantity and quality of the timber which is requisite to the trees most proper for any given purpose: thus preferring the *crop* of *sale* timber from unnecessary spoil, by a less discriminate choice or method of proceeding.

TIMBER, *Stick of*, a term frequently applied to any large boled or stemmed tree of the timber kind: a fine, large, perfect timber-tree. See TIMBER and TREE.

TIMBER-Trees, the wood of timber, before it be felled, particularly that of oak, &c. See TREES.

For the raising, planting, transplanting, pruning, &c. of timber-trees, see SEMINARY, NURSERY, PRUNING, and TRANSPLANTING.

TIMBER-Wood, a term signifying that sort of wood which is employed or designed for the raising and growth of timber, in contradistinction to that of the under-wood or coppice kinds, or such as has little or no brush-wood or under-growths in it. There are but few cases in which it is not advantageous for timber-woods to be kept pretty clear and free from most sorts of under-growths, especially where they approach near the trees. See WOOD.

TIMBER-Wood or Tree, *Register of*, the account which is necessary to be kept of the timber-wood or trees of that kind, which are growing upon the different parts of a timbered estate. The writer of a late work on “Landed Property,” has advised that it should consist of all that is met with on the several divisions of an estate; setting forth the number of such trees in each of the different woods, groves, hedge-rows, and all other places, with the several species or kinds, the number which is affixed to each, and the admeasurement of each of them. Separate accounts, containing those trees of each particular division, being entered and kept; for the satisfaction and occasional use of the land-manager and the woodward. Such lists or registers are always of great utility and benefit to the proprietors of timber-wooded estates, as ascertaining their nature, state, and situation in many different respects.

TIMBER-Lode, in our *Old Writers*, a service by which tenants were to carry timber from the woods to the lord's house.

TIMBER, *Bearing of*. See BEARING.

TIMBER-Work, *Casing of*. See CASING.

TIMBER or *Timmer of Furs*, as ermines, martens, fables, and the like, denotes forty skins; of other skins, six score. Rust.

“Hæc civitas (sc. Cestrie) nunc reddebat de firma 45 libras et tres timbrias pellium martenaarum.” LL. Edw. Conf.

TIMBERS of *Ermin*, in *Heraldry*, denote the ranks or rows of ermin in noblemen's coats.

TIMBER, in *Falconry*. To *timbr*, is to nestle, or make a nest, as birds of prey do.

TIMBER, *Prick*, in *Botany*. See SPINDLE-Tree.

TIMBERS, in *Ship-Building*, the ribs of a ship, or the incurved pieces of wood branching outward from the keel in a vertical direction, so as to give strength, figure, and solidity to the whole fabric.

One timber in a ship is composed of several pieces united into one frame, which accordingly is called by the artificers a frame of timbers. The timbers whose planes are perpendicular to the keel, are called *square-timbers*; and those which are placed obliquely on the keel, as at the extremities of a ship, are called *cant-timbers*. The<sup>d</sup> foremost of those pieces on the ship's bow are called the *knuckle-timbers*; and the hindmost on the quarter, the *fashion-pieces*. See SHIP-BUILDING.

TIMBER and Room, or Room and Space, is the distance betwixt the moulding edges of two adjoining timbers, which must always contain the breadth of two timbers; and sometimes two or three inches between them.

TIMBO, in *Geography*, a town of Africa, on the Grain Coast. N. lat. 5° 28'. W. long. 9° 20'.

TIMBRE, or TIMMER, in *Heraldry*, denotes the crest of an armory, or whatever is placed atop of the escutcheon, to distinguish the degree of nobility, either ecclesiastical or secular.

Such as the papal tiara, cardinal's hat, the cross, mitre, coronet, mortar, and particularly the casques or helmets, which the ancients called more especially timbres, from their resembling a kind of bell without a clapper, which the French call timbre, or because they resounded like those timbres when struck. This is the opinion of Loifeau, who derives the word from the Latin, *tintinnabulum*.

TIMBREL, *Tabret*, or *Tambour de Basque*, in *Music*, is an instrument of very high antiquity; having been in use among the Hebrews, Greeks, and Romans. To the rim were hung bells or pieces of metal.

TIME is a portion or part of infinite duration. It is generally measured by motion, and chiefly by the motions of the heavenly bodies.

There is nothing perhaps of which the mind is less capable of forming a distinct idea than time, unconnected with the motions of sensible objects; and yet, on account of this connection, every one thinks it a subject with which he is familiarly acquainted, until an explanation is required.

The opinions of ancient philosophers on the subject are generally vague and contradictory. Pythagoras and Heraclitus maintained that time was a substance, but the Stoics considered it as unsubstantiated. Aristotle and the Peripatetians define time to be “a multitude of parts of motion, which pass and succeed each other in a continual flux, and have relations to each other, inasmuch as some are anterior and others posterior.” Archytas defined it to be “a continued and indivisible flux of *nows* or instants.”

The Epicureans considered “time as merely an object of the imagination, or an attribute given to things by the mind while contemplating them either as enduring or ceasing; as possessing a longer or shorter existence, as enjoying such existence, as having enjoyed it, or as being about to enjoy it.”

Lucretius, the great poet and philosopher of this sect, defines time as follows:

“Tempus item per se non est, sed rebus ab ipsis  
Consequitur sensus, transactum quid sit in ævo;  
Tum, quæ res instet, quid porro deinde sequatur:  
Nec per se quemquam tempus sentire fatendum est  
Semotum ab rerum motu, placidâque quiete.”

Lib. i. 460.

Thus

## TIME.

Thus translated by Creech :

“ Time of itself is nothing, but from thought  
 Receives its rise, by labouring fancy wrought  
 From things considered, whilst we think on some  
 As present, some as past, or yet to come.  
 No thought can think on time, that's still confess,  
 But thinks on things in motion or at rest.”

The above opinion of Lucretius, though fancied by many of the ancients, and even by some of the moderns, does not appear to have satisfied philosophers in general. Cicero says (1 de Invent.) “difficile est tempus definire.” Thus also St. Austin (2 Confess. 24.) observes, “si nemo ex me quærat quid sit tempus, scio; se quærenti explicare velim, nescio.”

Locke seems to have considered time more profoundly than perhaps any other philosopher. The following are among his opinions on the subject. Human Underst. vol. i. ch. 14.

“The answer of a great man to one who asked him what time was, ‘si non rogas intelligo,’ (which amounts to this; the more I set myself to think of it, the less I understand it,) might perhaps persuade one that time, which reveals all things, is not itself to be discovered. Duration, time, and eternity, are, not without reason, thought to have something very abstruse in their nature.

“To understand time and eternity aright, we ought with attention to consider what *idea* it is we have of *duration*, and how we came by it. 'Tis evident to one who will but observe what passes in his own mind, that there is a train of ideas which constantly succeed one another in his understanding as long as he is awake. Reflection on these appearances of several ideas, one after another in our minds, is that which furnishes us with the idea of *succession*; and the distance between the appearance of any two ideas in our minds, is that which we call *duration* (which see). Having thus got the idea of duration, the next thing natural for the mind to do, is to get some *measure* of this common duration, whereby it might judge of its different lengths, and consider the distinct order wherein several things exist: without which, a great part of our knowledge would be confused, and a great part of history rendered very useless. This consideration of duration, as set out by certain periods, and marked by certain measures or epochs, is that, I think, which most properly we call *time*.”

Nearly according to the above our modern Encyclopædists define time; viz. “a succession of phenomena in the universe, or a mode of duration marked by certain periods and measures, and principally by the motions or apparent revolutions of the sun.” Others define time to be “the duration of a thing, the existence of which is not without beginning or end; which distinguishes time from eternity.”

Time is distinguished into *absolute* and *relative*.

*Absolute time* is considered in itself, without any relation to bodies or their motions flowing uniformly. *Relative time* is the sensible measure of any portion of duration by means of motion. As the equal and uniform flux of time does not affect our senses; and as there is nothing in this flux that can make us know immediately time itself; we must, of necessity, have recourse to some motion, by which we can determine the quantity of time, by comparing parts of time with those of space that the moving body traverses. Therefore, as we judge that times are equal, when they flow whilst a body which is in a uniform motion traverses equal spaces; so likewise we judge that times are equal, when they flow whilst the sun, moon, and the other celestial luminaries, complete their ordi-

nary revolutions, which to our senses appear uniform. See *MOTION*.

But as the flowing of time cannot be accelerated nor retarded; as all bodies move sometimes quicker and sometimes slower; and as there is perhaps no perfectly uniform motion in nature, except the earth's rotation on its axis, some authors are of opinion that absolute time cannot be concluded to be something really distinct from motion: for supposing for a moment the earth and the other planets have been without motion ever since the creation, does it thence follow that the course of time would have been stopped or interrupted? Would not the duration of this state of rest have been equal to the time which has elapsed since the creation?

As absolute time is a quantity which flows in a uniform manner, and which is very simple in its nature, mathematicians represent it to the imagination by the most simple sensible magnitudes, particularly by right lines and by circles, with which absolute time appears to have a great analogy in respect of succession, the similarity of parts, &c.

In fact, it is not absolutely necessary to measure time by motion; for the constant and periodical return of a thing which happens or manifests itself by intervals equally distant from each other, as, for instance, the budding of a plant, &c. may do the same thing. It is said there are people in America who reckon years by the arrival and departure of birds.

Time is usually represented by the uniform motion of a point that describes a right line. The point is the successive state, present successively at different places, and producing by its fluxion a continual succession, to which we attach the idea of time. The uniform motion of an object also measures time; for when this motion takes place, the moving body traverses, for example, one foot in the same time in which it has traversed a first foot; therefore, the duration of things that co-exist with the moving body whilst it traverses one foot being taken as one, the duration of those that will co-exist with its motion whilst it will be traversing two feet will be two, and so on; so that by this means time becomes commensurable, since we can assign the reason of one duration to another duration that we had taken for unity. Thus, in clocks, the hand moves uniformly in a circle: the twelfth part of the circumference of this circle is unity, and time is measured by this unity, by saying two hours, three hours, &c. So likewise one year is taken for one, because the revolutions of the sun in the ecliptic are equal, or nearly so, to our senses; and we make use of it to measure other durations in relation with this unity. We know the attempts made by astronomers to find a uniform motion, to enable them to measure time exactly; and this is what has been best done by means of pendulums. See *PENDULUM*.

There is no measure of time exactly correct. Every one has his own measure of time in the quickness or slowness with which his ideas succeed each other; and from these different degrees of quickness in different persons, or in the same person at different times, arise these modes of speaking, *I have found the time very long, or very short*; for time appears long to us, when the ideas succeed each other slowly in our mind, and *vice versa*. The measures of time are arbitrary, and may vary among different people: the only one that is universal is the present instant; and yet some deny the existence of present time, as being constantly on the wing; or, according to Horace, (Carmen XI.)

“ Dum loquimur fugerit invida ætas.”

Time is indeed an inexhaustible subject for figurative and poetical allusions, and even for paradoxes. Thus, it is said

to owe its own immaterial being to the creation of material order; to have all its portions measured by the periodical motions of matter, and yet to be distinct from, and independent of, those motions for its existence, though it could not exist until they existed: also that it operates upon every thing, yet touches nothing. Many other contradictory properties might be mentioned, but such tend to darken rather than to elucidate the subject. Some philoſophers have gone even ſo far as to deny the exiſtence of time; for if there be no preſent, there cannot be any future, and the paſt certainly has no exiſtence.

We now come to conſider the application of mathematics to time, as connected with aſtronomical computations, where the ſubject is accurately calculated, and rendered ſubſervient to the important purpoſes of meaſuring ſpace, by which the longitude is determined both in the heavens and on earth.

*Aſtronomical time* is diſtinguiſhed into ſolar or apparent time, mean time, and ſidereal time.

*Apparent time*, alſo called *true ſolar* and *aſtronomical time*, is regulated by the apparent motions of the ſun. *Mean* or *mean ſolar time*, alſo called *equated time*, is a mean or average of apparent time: and *ſidereal time* is ſhewn by the diurnal revolutions of the fixed ſtars.

An *apparent day* is the interval between two ſucceſſive tranſits of the ſun's centre over the ſame meridian, which interval is ſubject to continual variations, owing to the eccentricity of the earth's orbit, and the obliquity of the ecliptic to the equator. Theſe variations are computed in a table, for which ſee *EQUATION of Time*.

A *mean day* is the interval that would be obſerved between two ſucceſſive tranſits of the ſun's centre over the ſame meridian, if the earth's orbit were circular, and the ſun always in the equinoctial. Thus the intervals or tranſits would be all equal, ſuch as are ſhewn by a clock that goes exactly 24 hours in a day, and  $365^d 5^h 48^m 48^s$  in a year. A clock thus ſet is ſaid to be adjusted to mean time.

A *ſidereal day* is the interval between two ſucceſſive tranſits of a ſtar over the ſame meridian; which interval is uniform, becauſe all the fixed ſtars make their revolutions in equal times, owing to the uniformity of the earth's diurnal rotation on its axis.

The ſidereal day is ſhorter than the mean ſolar day by  $3^m 56^s.55$  ſidereal time. This difference ariſes from the ſun's apparent annual motion from weſt to eaſt, which leaves the ſtar as it were behind. Thus, if the ſun and a ſtar be obſerved on any day to paſs the meridian at the ſame inſtant, the next day, when the ſtar returns to the meridian, the ſun will have advanced about a degree eaſterly (his daily portion of the ecliptic): and, as the earth's diurnal rotation on its axis is from weſt to eaſt, the ſtar will come to the meridian before the ſun, inſomuch that at the end of the year it will have gained a day on the ſun, that is, it will have paſſed the meridian 366 times, while the ſun will have paſſed it but 365 times. Now as the ſun appears to perform his revolution of  $360^\circ$  in a year, ſay, as  $365^d 5^h 48^m 48^s : 360^\circ :: 1^d : 59^m 8^s.3$ , which is the ſpace the ſun would deſcribe in a day, if all the days were of an equal length; and this ſpace reduced to time,  $= 3^m 56^s.55 =$  the exceſs of a *mean day* above a *ſidereal day*, in ſidereal time, or  $3^m 55^s.91$  in mean ſolar time.

It therefore appears that the earth deſcribes about its axis an arc of  $360^\circ 59^m 8^s.3$  in a *mean ſolar day*, and an arc of  $360^\circ$  in a *ſidereal day*; therefore, as  $360^\circ 59^m 8^s : 360^\circ :: 24^h : 23^h 56^m 4^s.09 =$  the length of a ſidereal day in mean

ſolar time, or the interval between two ſucceſſive tranſits of a ſtar over the ſame meridian.

Hence the following general rule for converting ſidereal to mean time, and the contrary:

As  $24^h : 23^h 56^m 4^s.09 ::$  any portion of ſidereal time to its equivalent in mean time. And as  $23^h 56^m 4^s.09 : 24^h ::$  any portion of mean time to its equivalent in ſidereal time. Thus Tables I. and II. in our article *CHRONOMETER* are computed.

From what has been ſaid, it is evident that apparent and mean time are the ſame, with reſpect to the length of the hour, minute, and ſecond of each, as well as of the year; but the hour, minute, and ſecond of ſidereal time are reſpectively leſs in the above proportion. It is only the ſolar and mean days that differ, and this variation is marked by the times of commencement. Thus the apparent day always begins when the ſun's centre is on the meridian; but the mean day commences ſometimes ſooner and ſometimes later, as computed in the tables of the equation of time. See *EQUATION of Time*.

The *reduction of time*, that is, to turn apparent, mean, and ſidereal time into each other, may be performed by the following theorems, taken from Kelly's Spherics, p. 208, ed. 4.

- Let A = apparent time.
  - M = mean time.
  - S = ſidereal time.
  - E = the equation of time at apparent noon.
  - e = the daily difference of the equation of time.
  - R = the ſun's right aſcenſion at apparent noon.
  - r = the daily increaſe of the ſun's right aſcenſion.
  - N = the ſun's mean right aſcenſion at mean noon, *i. e.* the ſidereal time at mean noon.
  - m = the reduction of ſidereal time at the rate of  $3^m 55^s.91$  for 24 hours ſidereal time.
  - s = the reduction of mean to ſidereal time, at the rate of  $3^m 56^s.55$  for 24 hours mean time.
- And let  $\pm$  ſignify that addition or ſubtraction which is to be uſed according as the quantity under conſideration is increaſing or decreaſing.
- Alſo let  $A' = M \pm E$ , as applied in caſe 2.

Formulæ for the Reduction of Time.

Caſe.	Given.	Req <sup>d</sup> .	Solution.
1	A	M	$M = A \pm E \pm \frac{A \times e}{24}$
2	M	A	$A = A' \pm \frac{A' \times e}{24 \pm e}$
3	M	S	$S = N + \overline{M + s}$
4	S	M	$M = \overline{S - N - m}$
5	A	S	$S = A + \frac{A \times r}{24} + R$
6	S	A	$A = S - R - \frac{S - R \times r}{24 + r}$

## TIME.

The foregoing six cases comprehend all the varieties that occur in the reduction of time; and for their numerical illustration, see our article *CHRONOMETER*.

For the application of time to the measurement of space and motion, see *LONGITUDE* and *LUNAR Observations*.

*TIME, Civil*, is astronomical time accommodated to civil uses, and formed and distinguished into years, months, days, and hours, with their subdivisions: the reckoning of the hours as civil to twelve twice over, is meant to mark the natural day.

*TIME*, in *Heathen Mythology*, was personified and deified. Saturn was usually the symbol of it. Time was represented with wings, to mark the rapidity with which it passes, and with a scythe, to signify its ravages. It was divided into several parts; the century, the generation or space of thirty years, the lustrum, the year, the seasons, the months, the days, and the hours; and each of these parts had its particular figure in men or women, according as their names were masculine or feminine; their images were used in religious ceremonies.

*TIME*, in *Music*, is an affection of sound, by which we denominate it *long* or *short*, with regard to its continuance in the same degree of tune.

Time and tune are the great properties of sound, on whose difference or proportions music depends: each has its several charms: where the time or duration of the notes is equal, the differences of tune alone are capable of entertaining us with endless pleasure.

And of the power of time alone, *i. e.* of the pleasures arising from the various measures of long and short, swift and slow, we have an instance in the drum, which has no difference of notes, as to tune.

Time, in music, is considered either with respect to the absolute duration of the notes, *i. e.* the duration considered in every note by itself, and measured by some external notion foreign to the music; in respect to which the composition is said to be *quick* or *slow*: or it is considered with respect to the relative quantity or proportion of the notes compared with one another. See *NOTE*.

The signs or characters by which the time of notes is represented, are shewn under the article *CHARACTERS*, in *Music*, where the names, proportions, &c. are also expressed.

A semi-breve, for instance, is marked to be equal to two minims, a minim to two crotchets, a crotchet to two quavers, and so on, still in a duplicate ratio, *i. e.* in the ratio of 2 : 1. Now where the notes respect each other thus, *i. e.* where they are in this ratio, the music is said to be in *duple*, *i. e.* *double* or *common* time.

When the several notes are triple of each other, or in the ratio 3 : 1, that is, when the semi-breve is equal to three minims, the minim to three crotchets, &c. the music is said to be in *triple* time.

To render this part as simple as possible, the proportions already stated among the notes are fixed and invariable: and to express the proportion of 3 : 1, a point (.) is added to the right side of any note, which is deemed equivalent to half of it; and by this means a pointed semi-breve, O. becomes equal to three minims, and so of the rest.

From hence arise several other ratios constituting new kinds of triple time; as 2 : 3 and 3 : 4, &c.; but these, Mr. Malcolm observes, are of no real service, and are not perceived without a painful attention. For the proportions of the times of notes, to afford us pleasure, must be such as are not difficultly perceived; on which account the only ratios fit for music, beside that of equality, are the double and triple.

*TIME, Common* or *Duple*, is of two species: the first, when every bar or measure is equal to a semi-breve, or its value in any combination of notes of a less quantity.

The second, where every bar is equal to a minim, or its value in less notes. The movements of this kind of measure are various, but there are three common distinctions; the first *slow*, signified at the beginning by the mark C; the

second *brisk*, signified by ; the third *very quick*, signi-

fied by .

But what that slow, brisk, and quick is, is very uncertain, and only to be learned by practice. The nearest measure we know of, is to make a quaver the length of the pulse of a good watch; then a crotchet will be equal to two pulses, a minim to four, and the whole measure or semi-breve to eight. This may be reputed the measure of *brisk* time; as for the *slow*, it is as long again, and the quick is only half as long.

Some propose to measure it by imagining the bar as actually divided into four crotchets, in the first kind, and so make the whole as long as one may distinctly pronounce these four words, *one, two, three, four*, all of equal length: so that the first crotchet may be applied to *one*, the second to *two*, &c. and for other notes proportionally: and this is made the brisk movement of *common* time.

The whole measure then of common time is equal to a semi-breve, or a minim; but these are variously subdivided into notes of less quantities.

Now to keep the time equal, we make use of a motion of the hand or foot, thus: knowing the true time of a crotchet, we shall suppose the measure or bar actually subdivided into four crotchets for the first species of common time; then the half measure will be two crotchets; therefore the hand or foot being up, if we put it down with the very beginning of the first note or crotchet, and then raise it with the third, and then down to begin the next measure; this is called *beating of time*.

By practice, they get a habit of making this motion very equal, and consequently of dividing the measure or bar into equal parts, up and down; as also of taking all the notes in the just proportion, so as to begin and end them precisely with the beating. In the measure of two crotchets, they beat down the first, and the second up. Some call each half of the measure in common time, *a time*; and so they call this the mode or measure of *two times*, or the *duple* measure.

Again, some mark the measure of two crotchets with a 2 or  $\frac{2}{2}$ , signifying it to be equal to two notes, of which four make a semi-breve; and some mark it  $\frac{4}{4}$  for quavers. Malcolm's Music, p. 385, &c.

*TIME, for Triple.* See *TRIPLE-Time*.

*TIME-Table.* See *CHARACTERS, FRANCO*, and *Plate I\**.

*TIME*, in *Fencing*. There are three kinds of time; that of the sword, that of the foot, and that of the whole body. All the times that are perceived out of their measure, are only to be considered as appeals, or feints, to deceive and amuse the enemy. See *FENCING*.

*TIME*, in the *Manege*, is sometimes taken for the motion of a horse, that observes measure and justness in performing a manege; and sometimes it signifies the interval between two of his motions. In the manege of a step and a leap, the horse makes by turns a corvet between two caprioles; and in that case the corvet is one time that prepares the horse for the caprioles.

The times observed in making a stop are nothing but so many falcades.

TIME also signifies the effect of one of the aids; thus, we say, a good horseman disposes his horse for the effects of the heel, by beginning with one time of the legs, and never runs precipitately upon his times.

TIME of *showing Flowers*, in *Gardening*, among florists, the period or season of exhibiting those of the finer kinds, either on the summer stages for this purpose, or in other places. For some sorts of flowers, as those of the auricula and other similar kinds, it is usually from about the latter part of April until about the beginning of May, in situations near the metropolis, in which length of period or season there are commonly about four such shows at different suitable intervals of time.

In other sorts of fine flowers, the shows are mostly somewhat later, and do not last any great length of time, as for tulips, carnations, and some other similar kinds; and there are still a few others which last differently in regard to time, or a great part of the summer season. See SUMMER-Stage.

TIME-Keepers, in a general sense, denote instruments adapted for measuring time. See CHRONOMETER.

TIME of Peace. See PEACE.

TIME, in *Chronology*. See CHRONOLOGY.

TIME, in *Grammar*. See TENSE, PROSODY, and MEASURE.

TIME, in *Mechanics*. See MOTION.

TIME, *Periodical*. See PERIOD.

TIME, *Equation of*. See EQUATION.

TIME, *Kipper*. See KIPPER.

TIME, *Unity of*. See UNITY.

TIMELFIOERD, in *Geography*, a bay of the North sea, on the coast of Norway; 32 miles W. of Romsdal.

TIMEN-GUY, in *Rigging*, a rope fastened at one end to the fore-shrouds, and nailed at the other end to the anchor-stock, on the bow, to prevent the fore-sheet from c tangling.

TIMENS, in *Geography*, a town of Norway, in the province of Christianland; 15 miles S. of Stavanger.

TIMERA, a town of Sweden, in the province of Medelpadia; 5 miles N. of Sundfwall.

TIMERY, a town of Hindoostan, in the Carnatic; 6 miles S. of Arcot.

TIMERYCOTTA, a town and fortrefs of Hindoostan, in Golconda; 54 miles S.E. of Hydrabad. N. lat. 15° 20'. E. long. 79° 26'.

TIMERYDURGAM, a town of Hindoostan, in Baraul; 21 miles N.N.W. of Darempoury.

TIMESQUIT, or TIMASQUIT, a town of Africa, in the country of Darah; 80 miles W. of Tafilet.

TIMETHUS, in *Ancient Geography*, a river of Sicily, the mouth of which is placed by Ptolemy between Tyndarium and Agathyrium.

TIMICI, *Abat-el-Wed*, a place in Africa, S.E. of Arfinaria, on the banks of one of the rivers which formed the Carteimus; and in which are ruins.

TIMIRU, in *Geography*, a town of the island of Cuba; 20 miles W.S.W. of Villa del Principe.

TIMMER. See TIMBER and TIMBRE.

TIMMIA, in *Botany*, received that name from the celebrated Hedwig, in compliment to his correspondent Mr. Joachim Christian Timm, an apothecary and principal magistrate at Malchin, who published *Flora Megapolitana Prodromus*, in 1788. This makes an octavo volume, containing the names, characters, places of growth, &c. of the native plants of Mecklenburg-Schwerin, disposed according to the Linneean system, with the abolition of the 20th, 21st,

22d, and 23d classes, and a separation of all the grasses and grafs-like plants together, into a class by themselves. The number of species is 1200, of which 501 belong to the *Cryptogamia*, the other classes being far from rich. Neither does the work contain any critical observations to compensate for the inconvenience of the above changes.—Hedw. Crypt. v. 1. 83. Sp. Musc. 176. Schreb. Gen. 761. Timm. Megapol. 234.—Class and order, *Cryptogamia Musci*. Nat. Ord. *Musci*.

Ess. Ch. Capsule ovate. Outer fringe of sixteen pointed teeth: inner membranous, with jointed teeth combined at the top. Male flowers on the same plant, axillary, stalked, bud-shaped.

The known species are two only. *T. megapolitana*, Hedw. Crypt. v. 1. 83. t. 31, found near Malchin, growing in boggy ground among *Carexes*, as well as in North America: and *T. austriaca*, Hedw. Sp. Musc. 176. t. 42. f. 1—7, native of Schneeberg, a celebrated Austrian mountain. Both have the habit of *BRYUM*, or *MNIUM*; see those articles. We cannot consider *Timmia* as an admissible genus, being distinguished from *Bryum* merely by the connexion of the points of the inner fringe, like *POILIA* of Hedwig, which the reader will find in its proper place. Under the head of *FRINGE of Mosses* we have suggested the objections to founding genera on the differences of figure in the inner fringe, which are uncertain, variable, very difficult to observe, and lead to unnatural distinctions. Characters derived from the situation of the male flowers are subject to still greater difficulties and objections.

TIMMISKAMAIN LAKE, in *Geography*, a lake of North America, in Canada. This lake gives name to a tribe of Indians near it. N. lat. 47° 30'. W. long. 80° 40'.

TIMMS, a town of North Carolina; 15 miles S.S.E. of Fayetteville.

TIMOAN, an island in the East Indian sea, inhabited by Malays: ships may obtain wood and water; the anchorage is good almost all round the island; but the inhabitants are surly and insolent. N. lat. 2° 58'. E. long. 104° 25'.

TIMOCHARIS, in *Biography*, an astronomer of Alexandria, who flourished in the third century B.C. He observed B.C. 294, on the 9th of March, four hours before midnight, a conjunction of the moon with the Spica Virginis, the star being then, according to him, 8° W. from the equinoctial point.

TIMOK, in *Geography*, a river of Servia, which rises in mount Hæmus, and runs into the Danube, 6 miles N. of Viddin.

TIMOLEON, in *Biography*, a distinguished example of patriotism and attachment to liberty, was of noble parentage, and a native of Corinth. His discriminating character was exhibited at an early age in the rescue of his brother Timophanes at a moment of danger, when he was thrown from his horse in an engagement with the Argives, and surrounded by the enemy. Timoleon flew to his aid, covered him with his shield, and after receiving many wounds, liberated his brother. This same brother, being placed by the Corinthians for the safety of their city at the head of a standing body of mercenaries, assumed the sovereignty of the state; but Timoleon, dreading the subversion of the liberty of his country by the ambition of his own brother, remonstrated against his proceedings; and, finding his own attempts for restraining him ineffectual, engaged two friends to concur with him in his efforts; but their united endeavours proving of no avail, Timoleon is said to have stood by him weeping, with his face covered, while his associates dispatched the tyrant. Such is the account of Plutarch; but Diodorus says, that Timoleon killed his brother with his own hand. This

act, however, followed by the reproaches of his friends, and by the imprecations of his mother, was the occasion of poignant distress to Timoleon; so that he withdrew from all public affairs, and for some years wandered about in the most disconsolate state, in the most gloomy recesses of his grounds, without ever approaching the city. After a retirement of twenty years, the Syracusans applied to Corinth for succour in a season of calamity, occasioned by domestic tyrants, and by the hostile preparations of the Carthaginians. The Corinthians passed a vote for granting the assistance that was requested, and Timoleon, in preference to many others who were proposed, was appointed their general. Timoleon sailed for Sicily in the year B.C. 344, with a fleet of about ten sail, and arriving, by a stratagem, in the port of Tauromenium, disembarked his army, consisting of no more than one thousand men. Success and victory attended his arms; and having become master of Syracuse, he destroyed its citadel as a nest of tyrants, and caused to be erected in its place a hall of judicature; thus intimating, that the state was now to be governed by laws, and not by arms. He also colonized the city, which had been depopulated, by an importation of Greeks, and by inviting all the fugitives to return. Timoleon at the same time extended his attention to the other cities of Sicily, reducing those inhabitants who had usurped authority to the rank of private citizens, or sending them as exiles to Corinth. He prepared likewise to resist the Carthaginians, who were sending a powerful army against the island; and with a small force, but by extraordinary displays of valour and military skill, totally defeated them. He afterwards directed his attention to the internal state of Sicily, and by the measures which he adopted, settled its inhabitants in the unmolested possession of the advantages which they enjoyed in a fertile soil and propitious climate. The Sicilians acknowledged their obligations with gratitude and respect, and considered Timoleon as the common father of the nation. Having fixed his abode in Syracuse, he sent to Corinth for his wife and family, and lived as a private citizen, respected and esteemed for his virtues. Two demagogues, however, contrived to disturb his tranquillity, and brought charges against him, which he thought unworthy of refutation, and in reference to which he merely said, "he could not sufficiently express his gratitude to the gods for allowing him to see the time when the Syracusans enjoyed the liberty of speaking what they thought proper." Whilst Greece was involved in the calamities of a civil war, and in conflicts which terminated in the loss of public liberty, Timoleon was unmolested and tranquil, in a country which he had contributed to render happy. Fortunate in all his transactions after he left Corinth, he ascribed his successes to the goddess Fortune, and dedicated to her the house in which he resided. It has been observed, that in the system of the ancients, a regard to these nominal and fictitious deities did not exclude their belief of a superintending providence: and a particular instance occurs in the history of Timoleon which would lead him to imagine that his life and its incidents were under a providential care and direction. Soon after his arrival in Sicily, two strangers were hired to assassinate him: and whilst he was sacrificing in the temple of Adranum, where he then lived, these murderers mixed in the throng, and were preparing to execute their commission. At this instant a man gave one of them a blow on the head with his sword, which laid him at his feet, and then fled to the top of a rock. The other, supposing their design had been discovered, laid hold of the altar, and intreated Timoleon to spare his life, on condition of his revealing the whole plot. The first fugitive being brought down from the rock, asserted that he had committed no crime, because the

man whom he had struck had murdered his father in the city of Leontium. Such an escape would naturally impress a mind less thoughtful than that of Timoleon.

At a late period Timoleon lost his sight, and this affliction he bore with perfect resignation: and it was alleviated to him by the assiduous attentions of the Syracusans. In his old age he was revered by the Syracusans as a father in the midst of his family: and at length terminated his life by a slight disease, in the year B.C. 335. His funeral obsequies were attended by a great number of people; and when the body was placed on the pile, a herald made the following proclamation: "The people of Syracuse inter Timoleon the Corinthian, the son of Timodemus, at the expence of two hundred minæ: they honour him, moreover, through all time, with annual games, to be celebrated with music, horseracing, and wrestling: as the man who destroyed tyrants, subdued barbarians, repopled great cities which lay desolate, and restored to the Sicilians their laws and privileges." A monument was afterwards erected to his memory in the market-place, which being surrounded with porticoes and other public buildings, was made a place of exercise for the youth, and named the "Timoleontæum." Plut. Vit. Timol. Anc. Un. Hist.

TIMON *the Phliasian*, a disciple of Pyrrho, flourished in the time of Ptolemy Philadelphus, and lived to the age of ninety years. At an early age he visited Megara, for the advantage of Stilpo's instructions in dialectics, and afterwards removed to Elea, where he became a hearer of Pyrrho. He first professed philosophy at Chalcedon, and afterwards at Athens, where he remained till his death. He took so little pains to invite disciples to his school, that it has been said of him, that as the Scythians shot flying, Timon gained pupils by running from them. This indifference to his profession was probably owing to his love of ease and indulgence; for he was fond of rural retirement, and so much addicted to wine, that he held a successful contest with several celebrated champions in drinking. This disposition probably led him to embrace the indolent doctrine of scepticism. He seems to have treated the opinions and disputes of the philosophers with contempt, for he wrote with sarcastic humour against the whole body. His poem, entitled "Silli," often quoted by the ancients, was a keen satire, abounding with bitter invectives against men and doctrines. The remaining fragments of this poem have been industriously collected by Henry Stephens, in his "Poësis Philosophica." The public succession of professors in the Pyrrhic school terminated with Timon. Brucker by Enfield.

TIMON, SAMUEL, a writer of history, was born at Tirnau, in Hungary, and died at Cassovia, in 1736, at the age of sixty-one years. In 1693 he entered among the Jesuits, and being of feeble constitution, declined the labours of the society, and devoted himself to literary occupation, particularly to the history of his own country, in reference to which he published several works. Nouv. Dict. Hist.

TIMONEER, TIMONIER, Fr., in *Sea Language*, the helmsman, or person who manages the helm to direct the ship's course.

TIMONITIS, in *Ancient Geography*, a country of Asia, in Paphlagonia, in the vicinity of Bithynia. Strabo and Ptolemy.

TIMONVILLE, in *Geography*, a town of France, in the department of the Moselle; 9 miles W. of Morhange.

TIMOORGOODA, a town of Hindoostan, in the circle of Cicacole; 10 miles S.W. of Cicacole.

TIMOPHEEVA, a town of Russia, in the government of Irkutsk, on the Ilin; 32 miles N.W. or Vercholenk.

TIMOR, an island in the East Indian sea, about 120

miles in length, and 33 in breadth. The Portuguese were the first Europeans who formed any kind of settlement on this island, who fled to it as a place of refuge from their enemies, the Dutch. But they were pursued by those implacable enemies, and in the year 1613 driven from Cupan, or Coupang, a town situated at the west end of the island, where the Dutch have ever since possessed and garrisoned a fort which the Portuguese had erected. The chief of the natives, or king of the island, is by the Dutch called *keyser* (emperor). Some Portuguese reside in the north part of the island. The principal productions are sanders or sandal wood and wax, which the Dutch receive in exchange for coarse linens or piece-goods; but on the whole, the profit arising from the commerce is little more than sufficient to defray the expences, and the settlement in all probability is continued merely to keep out other nations. S. lat.  $7^{\circ} 16'$  to  $10^{\circ} 24'$ . E. long.  $124^{\circ}$  to  $126^{\circ} 21'$ .

TIMOR Laut, or *Laot*, signifying in the Malacca language *sea*, an island in the East Indian sea, about 60 miles in circumference. S. lat.  $7^{\circ} 25'$ . E. long.  $132^{\circ} 16'$ .

TIMOROSO, in the *Italian Music*, intimates that the song is to be played or sung in such a manner as to express an awe or dread, either to shew respect, or to represent fear.

TIMOROUS, in the *Manege*. See STARTING, SKITTING, &c.

TIMOTEO DA URBINO, in *Biography*, whose real name was T. della Vite, was born at Urbino in 1470. He received his education as an artist under F. Francia, at Bologna, but at the age of twenty-six returned to his native city, whence he soon after went to Rome to see his countryman, Raphael, and the great works in the Vatican which had recently acquired for him so much renown. Raphael employed him in painting the Sibyls in the church of La Pace, and was satisfied of his ability in the performance: so much so, that he allowed him to retain the Cartoons. After this he returned to Urbino, and there executed several great works for the cathedral and other public buildings. He improved his style, as it was natural he should, under the tuition of his great master: and his latter productions exhibit much grace and vigour in their execution. His most esteemed works are, the Conception, in the church of the Osservanti, at Urbino; and Christ appearing to Mary Magdalen, in S. Angeli, at Cagli. He died in 1524, aged fifty-four.

TIMOTHEUS, one of the most celebrated poet-musicians of antiquity, was born at Miletus, an Ionian city of Caria, 246 B.C. He was contemporary with Philip of Macedon, and not only excelled in lyric and dithyrambic poetry, but in his performance upon the cithara. According to Pausanias, he perfected that instrument by the addition of four new strings to the seven which it had before; though Suidas says it had nine before, and that Timotheus only added two, the tenth and eleventh, to that number.

It seems necessary here to state the several claims made in favour of different persons who have been said to have extended the limits of the Greek musical scale.

Many ancient and respectable writers tell us, that before the time of Terpander, the Grecian lyre had only four strings; and, if we may believe Suidas, it remained in this state 856 years, from the time of Amphion, till Terpander added to it three new strings, which extended the musical scale to a heptachord, or seventh, and supplied the player with *two conjoint tetrachords*.

It was about 150 years after this period, that Pythagoras is said to have added an eighth string to the lyre, in order

to complete the octave, which consisted of *two disjoint tetrachords*.

These dates of the several additions to the scale, at such distant periods, though perhaps not exact, may, however, if near the truth, shew the slow progress of human knowledge, and the contented ignorance of barbarous times. But if we wonder at the music of Greece remaining so many ages in this circumscribed state, it may be asked, why that of China and Persia is not better now, though the inhabitants of those countries have long been civilized, and accustomed to luxuries and refinements.

Boethius gives a different history of the scale, and tells us that the system did not long remain in such narrow limits as a tetrachord. Choræbus, the son of Athis, or Atys, king of Lydia, added a fifth string, Hyagnis a sixth, Terpander a seventh, and, at length, Lychaon of Samos, an eighth. But all these accounts are irreconcilable with Homer's Hymn to Mercury, where the chelys, or testudo, the invention of which he ascribes to that god, is said to have had seven strings. There are many claimants among the musicians of ancient Greece, to the strings that were afterwards added to these, by which the scale, in the time of Aristoxenus, was extended to two octaves. Athenæus, more than once, speaks of the *nine-stringed* instrument; and Ion of Chios, a tragic and lyric poet and philosopher, who first recited his pieces in the 82d Olympiad, 452 B.C. mentions, in some verses quoted by Euclid, the *ten-stringed* lyre; a proof that the third conjoint tetrachord was added to the scale in his time, which was about fifty years after Pythagoras is supposed to have constructed the octachord.

The different claimants among the Greeks to the same musical discoveries, only prove that music was cultivated in different countries; and that the inhabitants of each country invented and improved their own instruments, some of which happening to resemble those of other parts of Greece, rendered it difficult for historians to avoid attributing the same invention to different persons. Thus the single flute was given to Minerva, and to Marfyas; the syrinx, or fistula, to Pan, and to Cybele; and the lyre, or cithara, to Mercury, Apollo, Amphion, Linus, and Orpheus. Indeed, the mere addition of a string or two to an instrument without a neck, was so obvious and easy, that it is scarcely possible not to conceive many people to have done it at the same time.

With respect to the number of strings on the lyre of Timotheus, the account of Pausanias and Suidas is confirmed in the famous decree against him, for which see SENATUS-CONSULTUM.

It appears from Suidas, that the poetical and musical compositions of Timotheus were very numerous, and of various kinds. He attributes to him nineteen nomes, or canticles, in hexameters; thirty-six proems, or preludes; eighteen dithyrambics; twenty-one hymns; the poem in praise of Diana; one panegyric; three tragedies, the Persians, Phinidas, and Laertes; to which must be added a fourth, mentioned by several ancient authors, called "Niobe," without forgetting the poem on "The Birth of Bacchus." Stephen of Byzantium makes him author of eighteen books of nomes, or airs, for the cithara, to eight thousand verses, and of a thousand *Προσμίαι*, or preludes, for the nomes of the flute.

A musician so long eminent as Timotheus, must have excited great desire in young students to become his pupils; but, according to Bartholinus, he used to exact a *double price* from all such as had previously received instructions from any other master; saying, that he would rather instruct those who *knew nothing*, for *half price*, than have the trouble of *unteaching*

unteaching such as had already acquired bad habits, and an incorrect and vicious manner of playing.

Timotheus died in Macedonia, according to Suidas, at the age of ninety-seven; though the Marbles, much better authority, say at ninety; and Stephen of Byzantium fixes his death in the fourth year of the 105th Olympiad, two years before the birth of Alexander the Great; whence it appears that this Timotheus was not the famous player on the flute so much esteemed by that prince, who was animated to such a degree by his performance, as to seize his arms; and who employed him, as Athenæus informs us, together with the other great musicians of his time, at his nuptials. However, by an inattention to dates, and by forgetting that of these two musicians of the same name, the one was a Milesian, and the other a Theban, they have been hitherto almost always confounded.

TIMOTHY, a favourite disciple and companion of St. Paul, was the son of a Jewess by a Greek father, at Lystra in Isauria. He was the confidential associate and friend of St. Paul, and he addressed to him two epistles. (See EPISTLE.) According to the Roman martyrology, he was stoned to death at one of the festivals of Diana at Ephesus.

TIMOTHY Grass, in Agriculture, the common name of a grass which is said to be cultivated much in America. The seeds are said to have been carried from the state of Virginia, by Mr. Timothy Hanson, to that of North Carolina, where it is much grown, and from which circumstance it probably received its name. It is a sort of grass which thrives most in low, damp, marshy grounds; in such soils and situations, it will produce a fine turf in a short time. It is very luxuriant, grows to a considerable height, and has, in some sort, the appearance of wheat or rye, having a broad blade or leaf.

It may be noticed, that all sorts of cattle are said to be fond of it whilst in the green growing state, as well as in that of hay.

It is very productive, but coarse, and flowers late. Almost all the agriculturalists and travellers of America concur in giving this grass the highest commendations, as being the chief support of cattle wherever meadows are found. And from the inquiries made by Mr. Strickland, at the request of the Board of Agriculture, it appears to be extensively cultivated in the middle and northern states of the American union; he has frequently seen extraordinary crops of it growing as thickly as it could stand on the ground, three or four feet high, and in some instances as coarse as wheat-

straw. In this state it is cut before maturity; and as the hay in America is always well cured, however succulent it may be, at the time of cutting, horses prefer it to every other kind of hay, and thrive better upon it.

No other grasses approach it in produce; and it is stated to be particularly useful when mixed with red clover, in preventing it from falling too close to the ground. And since his return, by cultivating it in his garden he has ascertained it to be the same as the *cat's-tail* grass; but he is doubtful whether, if it were cultivated in the field, and should grow with American luxuriance, an English fun would be able to cure it with American perfection. It has, however, been said by Curtis, that it has no excellence that we are acquainted with, which the meadow fox-tail grass does not possess in an equal degree. In the trials made by the Rev. Mr. Young of keeping it closely fed down by sheep, upon a moist loam with a clayey marle bottom, the success was sufficiently encouraging to evince that it is deserving of attention; especially as its seeds may be easily procured in any quantity from America at the price of about one guinea the bushel; which, he observes, is enough, in conjunction with that of other grasses, for four or five acres of land. He thinks four pounds, the proportion for the acre as fixed by Rocque, who first introduced it into this country, are much too little; and is of opinion, that timothy is best adapted to moist loams, especially those of the peaty kinds.

It is said to be common in the dairy pastures of Cheshire, by the writer of the Agricultural Report of that county, but that, although it has been strongly recommended for cultivation, it seems by no means to merit the high character which was, at one time, given it. In moist lands or soils it grows tolerably well; but in all cases and kinds of land, it is thought much inferior to the meadow fox-tail, and the smooth-stalked meadow-grass. In a paper in the third volume of the "Transactions of the Highland Society of Scotland," the seed of this grass is put down as useful in a mixture for one crop of hay, to be succeeded by pasture, in land of the clay kind. And that, in these circumstances, late and coarse as it is, it may be beneficial in such sort of land, as it is in some degree congenial to it.

The experiments, however, lately made at Woburn Abbey, under the direction of his grace the duke of Bedford, the results of which are detailed in an appendix to a late work on "Agricultural Chemistry," place its comparative merits in the strongest and most certain point of view. It is there stated, that, at the time of flowering, from a clayey loam:

	Ounces.	Lbs.	oz.	dr.	
The produce <i>per</i> acre is	653400	0	=	40837	8 0 <i>per</i> acre.
Weight when dry of produce of same space	277695	0	=	17355	15 0
Weight lost by produce of same space in drying				23481	9 0
Weight of nutritive matter afforded by same	25523	7	=	1595	3 0
Weight of nutritive matter, lost by leaving the crop till the seed be ripe, exceeding one half of its value				2073	11 0
At the time the seed is ripe:					
Produce <i>per</i> acre	653400	0	=	40837	8 0
Weight when dry of produce of same space	310365	0	=	19397	13 0
Weight lost by produce of same space in drying				21439	11 0
Nutritive matter afforded by produce of same space	58703	14	=	3668	15 14
Latter-math, produce <i>per</i> acre	152460	0	=	9528	12 0
Affords of nutritive matter	4764	6	=	297	12 6

Sixty-four drachms of the straws, afford seven drachms of nutritive matter. The nutritive powers of the straws simply, therefore, it is said, exceed those of the leaves, in proportion of 28 to 8; and the grass at the time of flower-

ing, to that at the time the seed is ripe, as 10 to 23; and the latter-math to the grass of the flowering crop, as 8 to 10.

From the whole of these particulars, the comparative merits

merits of this grass will, it is supposed, appear to be very great; to which may be added the abundance of fine foliage which it affords early in the spring; in which respect it is inferior, it is said, to the *fertile meadow-grass* and *narrow-leaved meadow-grass* only. The value of the straws at the time the seed is ripe, exceeds that of the grass at the time of flowering, as 28 to 10; a circumstance which increases its value, it is thought, above many others: for, by this property, its valuable early foliage may be cropped, to an advanced period of the season, without injury to the crop of hay, which, in other grasses that send forth their flowering straws early in the season, would cause a loss of nearly one-half of the value of the crop, as is clearly shewn in many instances; and this property of the straws too, makes the plant peculiarly valuable for the purpose of hay.

In the smaller variety of this grass, the produce *per acre* on the same sort of land, at the time of ripening the seed; the weight when dry; the loss of weight in drying; and the nutritive matter afforded, are all very considerably less than in the above sort. In the latter-math produce on the same space, the quantity is the same as in that, but the nutritive matter afforded by it something less, as may be seen in the work referred to above.

In the bulbous-stalked species, the produce of the acre in the same kind of land, at the time of flowering; the weight when dry; that lost by the produce of the same space in drying; and the quantity of nutritive matter afforded by it, are all stated in the same work to be greatly less than in the first kind. And that this grass is inferior in many respects to that of the first sort. That it is sparingly found in meadows. And that from the number of bulbs which grow out of the straws, a greater proportion of nutritive matter might have been expected. This seems to prove, it is said, that these bulbs, in this sort of grass, do not form so valuable a part of the plant as the joints, which are so conspicuous in the first sort, the nutritive powers of which exceed those of this bulbous-stalked sort, as 8 to 28.

The qualities and useful properties of timothy grass are thus well pointed out and determined. See *PHLEUM* and *GRASS*.

*TIMOU*, in *Geography*, a town of Thibet; 225 miles E.S.E. of Lassa.

*TIMOUR*, or *TAMERLANE*, in *Biography*, a famous Oriental conqueror, was born at the village of Sebzar, in the territory of Cash, 40 miles S. of Samarcand, in the year 1336. At the time of his birth, the Khans of Cashgar, with an army of Getæ or Kalmucks, invaded Transoxiana. In 1357, Timour, having lately lost his father, collected a number of followers with a view of delivering his country; but being deserted by them, he retreated to the desert, and his army was there farther diminished by an action with the Getæ. He then wandered with his wife and seven companions, and being arrested, was kept two months in prison. Upon his liberation he swam over the rapid stream of Oxus or Jihon, and for some months led the life of a vagrant. In process of time, and on return to his native country, he was at the head of a considerable force, which enabled him to expel the Getæ from Transoxiana. After a civil war between him and his brother-in-law, the Emir Houffein, who was defeated and put to death, Timour, at a general diet held in 1370, was seated on the throne of Zagatai, at the city of Balk, and invested with the high title of Saheb Karan, or emperor of the Age; upon which he repaired to Samarcand, which became the seat of his empire. In consequence of this elevation, his ambition was directed to greater objects; and having reunited to Zagatai its

former dependencies, Karizme and Kaudahar, he fixed his views on the kingdoms of Iran or Persia, which were then occupied by various usurpers. Having reduced to submission Ibrahim, the prince of Sherwan, and secured the conquest of Fars or Persia proper, by the defeat and death of Shah Manfour, its prince, and the extirpation of his male progeny, he advanced from Shiraz to the Persian gulf, and exacted from the rich city of Ormuz an annual tribute. He then proceeded as a conqueror through the whole course of the Tigris and Euphrates from their sources to their mouths, entered Edeffa, and reduced the Christians in the mountains of Georgia. Retaliating upon the Getæ the invasion of his country, he passed the Sihon, and subdued the kingdom of Cashgar. In his several expeditions he penetrated as far as 480 leagues to the N.E. of Samarcand, and his emirs crossed the Irtysh into Siberia, another scene of his adventures and conquests near Kipzak or Western Tartary. Having entertained at his court Toctamish, a fugitive prince of that country, he sent him back with an army which established him in the Mogul empire of the North. Toctamish, however, after a reign of ten years, unmindful of his obligations to his benefactor, entered Persia with a mighty army, passed the Sihon, burnt the palaces of Timour, and reduced him to the necessity of contending for his capital and empire. But his triumph was of no long duration; for Toctamish was defeated, Kipzak was invaded, and Toctamish was again encountered and routed. This pursuit led Timour to the tributary provinces of Russia, and a duke of the reigning family was made captive on the ruins of Yeletz, his capital. Timour then marched southwards, and having pillaged, reduced to ashes the commercial city of Azoph, and also those of Serai and Astrachan. Under the influence of that ambition which was his ruling principle, he determined, in 1398, on the invasion of Hindooftan, and taking advantage of the rebellion against the weak Sultan Mahmood, he led an army of 92 squadrons, each of 1000 horse, and found great difficulty in traversing one of the snowy ridges between the Jihon and the Indus. Having crossed the Indus at Attuck, he entered the Panjab, and formed a junction with one of his grandsons, who had reduced Moultan. He then advanced towards Dehli, and having overthrown the army of Mahmood with its elephants, took possession of the capital, which he desolated by pillage and massacre. In this part of his march he manifested his religious zeal, by destroying infidels and idolaters without mercy, and having passed the Ganges about 100 miles N.E. of Dehli, he slaughtered a great number of the Guebres, or fire-worshippers. Whilst he was thus engaged, he received intelligence of the disturbances that had occurred on the confines of Georgia and Anatolia, of the revolt of the Christians, and of the ambitious projects of the Turkish sultan Bajazet. Having issued orders to his commanders, he hastened back to Samarcand; and after a short interval of repose, he proclaimed a seven years' expedition to the western parts of Asia. In the year 1400 he began with the Georgian Christians, and soon reduced them to the alternative of tribute or the Koran, and to prisoners he allowed no other choice but death or abjuring their religion. Returning from this warfare, he gave audience to the ambassadors of Bajazet, and after some time spent in mutual complaints and menaces, Timour laid siege to Siwas or Sebaste, on the borders of Anatolia, which he took and destroyed, burying alive with savage cruelty the Armenian garrison of 4000 men. He then invaded Syria, and advanced towards Aleppo, from which issued a numerous and well-appointed force to engage his army, the front of which was covered by a line of Indian elephants, carrying turrets filled with archers

and Greek fire. This formidable host threw the Syrians into disorder, and they fled with precipitation into the city, whither the enemy accompanied them. Timour soon became master of this opulent capital. While the streets were streaming with blood and resounding with cries, the conqueror held a theological conference with the doctors of the law; protesting, towards the close of his harangue, that he was not a man of blood, that he was not the aggressor in any of his wars, and that his enemies brought upon themselves the calamities they suffered: at the same time his soldiers were piling up a certain tale of heads of the enemy, in conformity to his orders, which, according to his custom, were afterwards piled up in columns and pyramids. From Aleppo, Timour proceeded to Balbeck, which he took, and then advanced towards Damascus. The sultan of Egypt had made great preparations for the defence of the city, and also for the assassination of the invader; but the plot of using poisoned daggers was discovered. The sultan pretended submission, and thus intended to put Timour off his guard; in the accomplishment of this artifice, the camp of Timour was suddenly attacked by the Syrian army, and thrown into disorder; but as soon as order was restored, the Syrians were repulsed, and driven to the gates of Damascus with great slaughter. The sultan in the mean while had returned to Egypt, and the city was left to make the best possible terms with the conqueror. During a truce, the soldiers broke into the city, massacred a great part of the inhabitants, and made captives of the rest, carried off a great quantity of rich plunder, and the city was reduced to ashes. Bagdad was the next place of importance to which Timour directed his views. Here Timour attended in person, and ordered a blockade; after 40 days' defence on the part of the inhabitants, a storm was commanded; and the death of some of the assailants was revenged by a massacre which produced a pyramid of 90,000 heads. The city was completely razed, with the exception of mosques, hospitals, and colleges. Timour's next object was the Ottoman empire. Having consulted the court-astrologists, and obtained a favourable answer, he put himself at the head of an almost innumerable force, and moved from the Araxes through Armenia and Anatolia, determining to carry the war to the heart of his rival's dominions. By his rapid advances, he invested Angora before Bajazet was apprized of his movement. Upon receiving this intelligence, the Ottoman hastened to its relief with a very large army. An engagement ensued, and the contest, which was very sanguinary, was at length decided by the defeat and capture of the Turkish emperor. This battle was fought in July 1402. Bourfa, Nice, and Smyrna were successively captured with the same circumstances of cruelty that marked the progress of Timour's arms.

Timour's conquests were extended from the Irtisch and Volga to the Persian gulf, and from the Ganges to the Archipelago; and beyond these limits his name was a sound of terror. Several princes purchased his favour by tribute, or by extraordinary tokens of respect. His want of shipping prevented his entrance into Europe. From his various expeditions, Timour did not return to Samarcand until the summer of 1404. In that capital, he displayed his magnificence and power in dispensing rewards and punishments, attending to the complaints of his people, erecting palaces and temples, and giving audience to ambassadors from Egypt, Arabia, India, Tartary, Russia, and Spain. Although he had professed satisfaction with the extent of his empire, yet he indulged a project of ambition of very great magnitude, which was that of the conquest of China. His preparations for this grand expedition were proportioned to its magni-

tude: 200,000 veteran soldiers were mustered, and they were furnished with means for conveying necessaries over the deserts which separate Samarcand from Peking. The aged emperor mounted his horse in the winter season, crossed the Sihon on the ice, and advanced to the distance of 300 miles from his capital; but at the camp of Otrar he was seized with a fever, which fatigue, and the imprudent use of iced water, soon rendered mortal. He was not unapprized of his danger; and having summoned round him his empresses and principal emirs, he declared his grandson Mehemet Jehan Ghir his universal heir and successor, and exacted an oath of obedience to him. He thus expired April 1st, 1405, in the 70th year of his age, and the 35th from his elevation to the throne of Zagatai. He left 53 descendants, and his posterity are to this day invested with the title of the Mogul emperors, although the power and dominions have passed into other hands.

His person and character are described by one of his biographers in the following terms: "Timour was tall and corpulent, with a wide forehead and large head, a pleasing countenance, and fair complexion. He had broad shoulders and strong limbs, but was maimed in one hand and lame of the right side. His eyes were full of fire; his voice was loud and commanding; his constitution hardy and vigorous; his understanding sound; and his mind firm and steadfast. In conversation he was grave and modest, and he prided himself in an attachment to truth. He delighted in reading history, and in discussing topics of science with the learned. His religion was fierce and fanatical, and he actually had, or affected to have, the superstitious reverence for omens, prophecies, saints, and astrologers, which is general in the East. He conducted his government alone, without favourites or ministers, and its spirit was absolute and untroubled rule. It was his boast to have introduced security and order throughout his wide dominions, and he challenged the praise of a benefactor to mankind; but no conquests have been attended with greater destruction of human lives, and greater desolation of flourishing cities and districts, than his were; and his ambition prompted him to extend his authority beyond the possible limits of a single government. He was not, however, a mere barbarian conqueror; but, if his institutions can be relied on as genuine, had enlarged ideas of the administration of a great empire." The "Institutions of Timour" have been made known in Europe by two translations from a Persian version: one in English by major Davy and professor White, Oxford, 1783; and the other in French, by M. Langles, Paris, 1787. Mod. Univer. Hist. Gibbon's Rom. Emp. Gen. Biog.

TIMOURKENG, or *Fortress of Iron*, in *Geography*, a town of Thibet; 60 miles W.N.W. of Latac.

TIMPALU; a town on the W. coast of the island of Celebes. N. lat.  $0^{\circ} 16'$ . E. long.  $119^{\circ} 44'$ .

TIMPANO, Ital., a kettle-drum. See TYMPANUM and TYMBALLES.

TIMPFE, or TYMPFE, in *Coinage*, an old silver coin of Poland. The *tympfe*, or *tympfen*, was reckoned at eighteen groschen, and the florins were valued at thirty groschen.

TIMURCOUGH, in *Geography*, a town of Thibet; 54 miles W.N.W. of Lahdach. N. lat.  $35^{\circ} 12'$ . E. long.  $77^{\circ} 12'$ .

TIMUS, in *Ancient Geography*, a town of Asia Minor, destroyed by an earthquake.

TIMYRA, a town of Asia, in Isauria.

TIN, *Stannum*, *Jupiter*, a whitish metal, softer, less elastic, and less sonorous, than any other metal, excepting lead. In the Chaldee language,  $\text{ܕܢܝܢ}$ , *tin*, signifies *slime, mud, or dirt*;

# TIN.

and when the Phœnicians came into Cornwall, and saw this metal in its ancient slimy state, they called it "the mud;" and hence, some have said, the name *tin*, in Cornu-British *stean*, is derived. Some of the ancients called it *plumbum album*, white lead, probably to distinguish it from common lead; not knowing that it was radically another metal.

This metal, denominated  $\kappaασσιτερος$ ; by the Greeks, and *stannum* by the Latins, seems to have been known from the most remote ages. It is mentioned by Moses; see Numb. xxxi. chap. 22. It was transported to the East from Spain and Britain by the Phœnicians, with which nations they are said to have carried on a lucrative commerce. Homer mentions it; and by Aristotle, the epithet  $κελευρον$ , or *Celtic*, is applied to it, indicating plainly the country from which it was procured. See *Tin-Trade of Britain*.

*Tin-Stone*, in *Mineralogy*, is the most common ore of tin, and is nearly a pure oxyd of that metal. The colour is brown, which passes from a blackish-brown to black, and from a red-brown to yellowish and greenish-white. It occurs crystallized and amorphous, and in grains and rolled pieces, varying from the magnitude of a grain of sand to that of an egg, or larger. The primitive form of the crystal is a flat octohedron: the angles are  $112^{\circ} 10'$  and  $67^{\circ} 50'$ . The figure of the crystals is seldom perfect; sometimes a rectangular prism is interposed between the pyramids that form the octohedron. The edges and summits of the crystals are frequently bevelled or truncated, from which a great variety of secondary forms is derived. The crystals are also frequently united, forming compound crystals or macles: indeed, so numerous are the secondary crystals of tin, that more than one hundred and eighty forms of single crystals have been observed, besides the compound crystals, of which there is a considerable variety. The surface of the crystals is commonly smooth and splendid, but is sometimes streaked. The structure is laminar, but the laminae are rarely visible. The fracture is uneven and imperfectly conchoidal, with a more or less shining and resinous lustre. When the laminar structure is displayed, the lustre is highly splendid. The crystals are semi-transparent or opaque, the darker colours being opaque, the lighter sometimes nearly transparent; and the intermediate shades are only translucent, or translucent at the edges. The streak is a greyish-white. Tin-stone is hard, scarcely yielding to the knife, and giving sparks with steel. It is brittle and heavy. The specific gravity varies from 6.759 to 6.970.

Before the blowpipe it decrepitates, and becomes paler; when finely pounded and mixed with borax, it is reducible on charcoal to the metallic state.

Tin-stone contains the following constituent parts, according to Klaproth.

	From Altonon.	Schlackenwald.
Tin	77.50	75.
Oxygen	21.50	24.50
Iron	0.25	0.50
Silex	0.75	

Some analyses of tin-stone give from two to three per cent. of alumine. The tin-stone of Cornwall, dressed in the common manner, is reckoned rich if it yield 65 per cent. of tin. Tin-stone may be distinguished from *wolfram* by its superior hardness, as it gives sparks with steel; but *wolfram* yields easily to the knife. The powder of tin-stone is a greyish-white, that of *wolfram* a reddish-brown. It is distinguished from *blende* by its superior hardness, and its not emitting a sulphurous odour when pounded. By its greater specific gravity and lustre, it may be distinguished from *garnet*; and from *schorl*, by its colour, lustre, form, and higher

specific gravity. This ore occurs in veins and beds, and disseminated in granite rocks. The veins intersect rocks of granite, gneiss, mica-slate, and slate: tin-stone occurs also in alluvial soil in the districts that contain tin-veins. See *STREAM-TIN*.

*Wood-tin* is a species of tin-stone, or oxyd of tin, found with stream-tin in rolled pieces, which are wedge-shaped or reniform, and sometimes globular. The structure is divergingly fibrous, with concentric laminae; and from the supposed resemblance to the transverse section of fine-grained wood, it received its name. The colour is commonly hair-brown or wood-brown, passing into yellowish-grey. The lustre is glimmering or silky. It is opaque, hard, and brittle: the specific gravity is 6.450. It is infusible before the blowpipe, but is changed to a brownish-red colour. When strongly heated in a charcoal crucible, it yields about 75 per cent. of metallic tin. The constituent parts are, according to Vauquelin,

Oxyd of tin	-	91
Oxyd of iron	-	9

In Cornwall, this ore is almost always found with stream-tin, and never in veins: it is said, however, to have been recently met with in cellular quartz, but in very minute pieces. It is one of the most common ores of tin in Mexico, and occurs in veins that traverse a porphyritic trap, and also in alluvial depositions. In some wood-tin, there is a small, black, smooth globule, from which, as from a centre, the fibres diverge: this has received the name of *bird's-eye tin*. Wood-tin, in its structure and mode of formation, probably bears a near analogy to the kidney-shaped hematite iron-ore.

*Bell-metal Ore, Tin Pyrites, or Sulphuret of Tin*, is an extremely rare ore of this metal, being found only in Cornwall, at Huel rock, in a vein accompanied with sulphuret of zinc and iron. Its colour is steel-grey, passing into yellowish-white: it has a metallic lustre, and granular uneven fracture: it yields easily to the knife, and is brittle. The specific gravity is 4.350. It fuses into a black slag before the blowpipe, exhaling at the time a sulphurous odour. It communicates a yellow or green colour to borax. The constituent parts differ in different specimens; according to Klaproth, they are as under:

Tin	-	34	26.50
Copper	-	36	30.
Iron	-	3	12.
Sulphur	-	25	30.50
Earthy matter	-	2	
		100	99

Klaproth observes, that the darker varieties of this ore are considerably poorer in tin than the lighter, but the proportion of iron increases.

*Analysis of the Ores of Tin.*—The analyses in the *dry way* were made by Klaproth in charcoal crucibles in the following manner, in which the results were always found to be constant. The ore was broken, and well cleaned from the matrix. One hundred grains were introduced into the cavity of a charcoal crucible, closing its orifice with a stopper of charcoal. The charcoal crucible was then fitted close into one of baked clay, and placed upon the forge-hearth before the nozzle of the bellows. The contents in the charcoal crucible were reduced to the metallic state by exposing it to a strong blast for half an hour. The button of metallic tin produced was a little blackish on the sides, and

and its surface coated with a greenish crust. From one hundred grains of Bohemian tin-stone, seventy-two grains and a half of tin were produced. Wood-tin and stream-tin were treated in a similar manner. Brown tin-stone, exposed to a porcelain fire in a clay crucible, formed a clear dense glass, greenish-grey in the middle, but of a bright yellow on the sides and top. The interior of the vessel was glazed, of a milk-white, and overlaid with many small groups of needle-shaped crystals of a light-brown colour. The inner surface of the lid was lined with similar crystals.

*Analysis of Tin-Stone in the humid way.*—To Klaproth we are indebted for the discovery of a simple and effectual mode of analysing tin-stone in the humid way. Boil 100 grains of this ore, finely pounded, with a solution of 600 grains of caustic potash. Evaporate to dryness, and then ignite the mass moderately for half an hour. Add boiling water, which dissolves the principal part of the mass, and the residue must again be ignited with six times its weight of caustic potash, and dissolved in water, as before. Add this to the last solution, and saturate the whole with muriatic acid, which will throw down an oxyd of tin. Let this be re-dissolved by an additional quantity of muriatic acid, and precipitated again by carbonate of soda; when lixiviated, and dried in a gentle heat, it acquires the form of bright-yellowish transparent lumps. This precipitate must be finely powdered, and once more dissolved in muriatic acid, assisted by a gentle heat. The insoluble part consists of silic. Dilute the solution, which is colourless, with from two to three parts of water, and introduce a stick of zinc, round which the tin will collect in a metallic state in the form of delicate dendritic laminae. Scrape off the tin, wash, dry, and fuse it under a cover of tallow in a capsule placed on charcoal. A button of fine metallic tin will remain at the bottom, the weight of which, deducted from that of the ore, indicates the proportion of oxygen.

*Analysis of Bell-metal Ore, or Tin Pyrites.*—To two drachms of finely powdered ore, add one ounce of muriatic acid, and half an ounce of nitric acid: this will dissolve the greater portion of the metallic part without heat, but a gentle heat must be applied to dissolve the whole. The sulphur will float on the surface of the solution, and must be separated by filtration. To the solution add carbonate of potash, which produces a greenish precipitate; let this be re-dissolved in diluted muriatic acid, and introduce a cylinder of pure tin, the weight of which is to be previously ascertained. By this means the copper will be separated in a metallic state. The cylinder of tin must now be carefully weighed, and the quantity which it has lost must be noted, and a cylinder of zinc must be introduced into the foregoing solution: this will separate all the tin, which must be melted with tallow and weighed. Deduct the quantity of tin which was lost by the cylinder, and the remainder will be the quantity of tin from the ore, held in the solution.

The sulphur separated by the first filtration must be ignited, and the unconsumed residue, dissolved in nitro-muriatic acid, must be added to the solution, in order to obtain the whole of the contents. The undissolved part will be the siliceous matrix.

The copper may be briskly digested in nitric acid, which will leave behind a minute portion of oxyd of tin, and ascertain the precise quantity of pure copper contained in the ore.

The method of getting, preparing, &c. the tin in the Cornish mines, much the best and most considerable in the world, is given us in the Philosophical Transactions, Abr. vol. ii. p. 569, &c. and more distinctly and fully in Pryce's Mineralogy.

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The working of the tin-mines is very hard and difficult, not only by reason of the great depth which the veins descend to, even as low as sixty fathoms; but also because the rocks, through which passages are frequently cut, are extremely hard. Nor is the soft shaking earth found in the tin-mines much less inconvenient to the workmen, both by reason of the fetid, malignant vapours it exhales, and of the current of water often met with in them: these disadvantages often render it impracticable for the workmen to hold it above four hours together.

The existence of native tin has been always doubted, and till of late absolutely denied by all mineralogists, both ancient and modern: however, Mr. Borlase, in his Natural History of Cornwall, p. 185, suggested, that its existence was far from being improbable; but he afterwards discovered three specimens of this metal, native or pure, of which he presented an account to the Royal Society. Mr. Mendes da Costa made several experiments on one of these specimens, with a view of proving that it was really tin; from which he infers, that it is perfectly ductile and malleable; and being bent between the teeth, gives the same crackling noise as tin always does: in an open fire it melts easily, calcines on the surface, and smokes; but forced in a stronger fire with borax, it detonates with small phosphorecent sparks, which is a property of pure tin; and it is only corroded to a white calx in spirit of nitre, and oil of tartar *per deliquium* being added to the solution, none of it was precipitated: whence he concludes, that it was pure tin. Philos. Transf. vol. lvi. art. 7. 39. Native tin is also said to have been found in Saxony and Malacca.

The ores of tin may be generally classed into shoad or shode, stream, and bal or mine tin. The shoad is disjunct, and scattered to some distance from its parent lode, and is pebbly or smoothly angular, of various sizes, from half an ounce to some pounds weight. See SHOAD.

Stream-tin ore is the same as shoad, but smaller sized, &c. See STREAM-Tin and STREAMING.

Bal or mine tin-ore often rises very rich; and instances frequently occur, in which it has been discovered in the richest and purest state imaginable. This kind of rich ore consists of the blackest grains or crystals, and is usually found at a moderate depth, or within the day-side of forty fathoms.

When the tin-ore is raised, or dug and drawn out of the mine, and laid by the shaft, it is first *spalled*, as the process is termed, which consists in breaking it into smaller fragments, and separating it from the worthless parts. When the best parts are sorted, they are divided into heaps by a hand-barrow, containing a sack and a half, or eighteen gallons. Each of these shares, called *doles*, being turned over, equally levelled and mixed, is then divided with a shovel into two equal parts; and after being bruised by large sledges to the size of a hazel-nut, is equally levelled and divided into four parts: the bruising and divisions are repeated at pleasure, till the quantity designed for sampling is well mixed, and made as fine as common sand. To make a rough guess, or coarse assay, the sampler takes a handful of it, and washes it on a shovel, till the impure parts are carried off by the water, and the more solid and heavy particles, that are left behind, are bruised with a sledge on the shovel, till the whole assumes the appearance of mud. This is again washed, and by a peculiar motion the metallic particles are collected together on the fore-part of the shovel. By repeating these bruising, washings, and motions, it becomes clean black tin, fit for the smelting-furnace. This is called a *wan*, (probably from the French *avant*, *foremost*,) as it is thrown upon the point of the shovel by the dexterity

of the sample trier. After the tin is thus cleaned, it is dried; and if there be as much black tin as will cover a shilling, or equal to the weight of a shilling, it is called a *shilling van*, which is not rich; but if the van will cover or equal the weight of a crown-piece, it is good tin-stuff, and called a *crown van*. The shilling van, the tanners say, will produce one hundred avoirdupois weight of block or white tin; and the crown van will yield five hundred weight of block tin, for every hundred sacks in measure of the respective doles from which the sample or van was taken, and so in proportion, to the richest tin-stuff, called *scove*, which is reckoned at the rate of ten thousand of white tin-metal for every hundred sacks. But a better judgment may be formed from the measure of a wine half-pint, than from a handful, which is indeed accounted a half pint. When the tin, thus measured, is reduced clean, and to a proper size, by using a large shovel, and taking off the sized tin on another shovel, the van is dried in a shovel upon the fire, and then weighed by pennyweights and grains; and for every pennyweight and a half the van weighs, the produce will be one hundred weight of black tin for every hundred sacks of tin-stuff; and for three pennyweights, two hundred weight, &c. in the same proportion; and if it be tin worth ten for twenty, or one for two, then the tin-stuff is valued at five hundred weight of block or white tin for every hundred sacks: if it be worth twelve for twenty, the stuff is valued at six hundred weight of white tin a hundred; or if it be worth only eight for twenty, it is only valued at four hundred weight of white tin a hundred, &c. This black tin is rather of a liver colour, though called black in contradistinction from white tin, or the metal produced from this black ore: it is very heavy, and may in general be computed to hold one-half clean metal, and some of it will produce thirteen, or even fourteen parts in twenty; whence the mode of expressing so much white tin for twenty of black tin, *i. e.* eight for twenty, ten for twenty, twelve for twenty, &c. Thus, if the van of one hundred sacks of tin-stuff weighs six pennyweights, being four hundred weight of black tin at twelve for twenty, the white tin or metal must be two hundred weight one quarter sixteen pounds.

In this method of sampling, the tanners form a near conjecture of the quantity of white tin which their doles of tin-stuff will produce at the smelting-house, when it is dressed, and brought into black tin. But if the black tin is combined with any bad mixture, as of mock-lead, copper, or mundic, after the van is bruised fine and washed, they lay the shovel over the fire, and burn the black tin, stirring it continually, till it has done smoaking: they then wash it again on the shovel, and thus the heterogeneous matter, becoming light by being burnt, is carried off by the water: for when black tin is calcined or burnt, it still retains its specific gravity; but copper, lead, and other crude minerals, become much lighter by torrefaction, and are easily separated from the tin by water. In the dressing and management of tin by stamping, &c. there are obtained two sorts of black tin, *viz.* the crop and rough, or the crop and leavings of tin. The first is the prime tin: immediately separable from the baser parts by its superior weight and richness. The latter is that which is carried off, and mixed with the lighter earthy parts, by being under size, and, therefore, more easily carried off by the water.

The tin-stuff, after this previous preparation and adjustment, is carried to the stamping-mill, in order to be dressed or pounded.

This operation of pounding in the stamping-mill is essential to the complete separation of the ore from the matrix,

through which it is disseminated. If full of slime, it is thrown into a pit, called a *buddle*, to wash away the earthy matter, and render the stamping more free, without choaking the grates. The ore is shovelled into a kind of sloping canal of timber, called the *pafs*, whence it slides by its own weight, and the assistance of a small stream of water, into the box where the lifters work: the lifters are raised by a water-wheel, and are armed at the bottom with large masses of iron, weighing nearly two hundred weight each: these pound or stamp the ore sufficiently to enable it to pass through the holes of an iron grate fixed at one end of the box. To assist its pulverization, a rill of water keeps it constantly wet, and it is carried by a small gutter into the fire-pit, where it makes its first deposition; the lighter particles running forward with the water into the middle pit, then into a third, where what is called the *slime* settles. (See *Dressing of ORES*, and *BUDDLE*.) From these pits the ore is carried to the *keeve*, which is a large vat containing water; in which it is farther purified by an operation termed *packing*, and which consists in beating the upper part of the contents with mallets for some minutes, by which the lighter particles are kept suspended, whilst the tin-ore, from its great specific gravity, subsides. The waste is skimmed and laid by, to be again buddled, under the name of the *skimpings*. The tin is sifted through a copper-bottom sieve into another keeve of water, by which the gravelly waste still remaining is separated from the clean tin; and the tin that runs through the sieve, if it requires no farther buddling, may be cleaned by repeatedly tossing and packing it as before. If it be necessary to buddle it again after it is sifted, let it be buddled and distributed in three parts, *viz.* the crop or purest, the crease or next in purity, and the hind-crease or tail, which is the most impure. The crop is to be cleaned by tossing, &c. and the crease must be buddled again, and out of this must be reserved as much as may be cleaned by tossing and packing. The remainder must be cleaned by an operation called *dilleughing*, from *dilleugh*, to let go, or send away. A dilleugh is a large fine hair-sieve, which the dresser holds in a keeve one-third full of water, into which the tin is thrown by a shovelful at a time, and which is shook so as to put the tin into motion: one side of this dilleugh is dipped in water, and raised again in such a manner, that the waste may run over, which is laid aside to mix with the skimpings, to make the samples of low value, called the *rough* (or *row*) tin. This usually undergoes another operation, in which, by a rill of water passing over the buddle in which it is placed, it is farther cleaned, and then dilleughed, so as to be fit to mix with the crop-tin.

Upon the same mechanical principle of separation, the tinner is capable of estimating the value of a sample of ore. For this purpose, the pounded tin-ore, or tin-stuff, as it is called, is placed on a shovel and washed under a stream, till the impure earthy parts are carried off by the water from its sides, when, by a particular and dexterous motion, not easily described, all the metallic particles are collected together on the fore-part of the shovel: this operation is called *vanning*, which we have already described.

When the tin-ore is contaminated with the different pyritous ores of copper, arsenic, and iron, it is first roasted in a burning-house, and then washed in water, by which means the tin, which is heavy, is easily separated.

By this process, as at present conducted in Cornwall, a considerable quantity of copper is lost; for being converted into sulphate of copper, which is soluble in water, it is lost by washing; whereas, if the roasted ore were suffered to remain in a close pit for a few days, and the water drawn off

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off into another pit, the copper might be separated by iron in a metallic state.

The leavings of tin, consisting of the slime and tails, *i. e.* of tin-mud and tin-gravel, are dressed by a particular kind of apparatus, for the construction and use of which, we must refer to Pryce's Min. Corn. p. 226, &c.

Each stamping-mill, which has constant work and water, will employ one man and five boys; and one hundred sacks are carried, stamped, and dressed, in the space of a few days, at the average rate of about four-pence *per* sack, or one guinea and a half *per* hundred.

When the tin-ore is dressed, it is divided into as many shares as there are lords and proprietors.

The next operation pertaining to tin-ore, or black tin, is that of *smelting* it. The Phœnicians, who traded to Cornwall for tin in the earlier ages, probably conducted this process by digging a hole in the ground, and throwing the ore on a charcoal fire, which perhaps was excited by a bellows. But having no idea of confining the fire, and directing its force on the substance to be smelted, they made no use of furnaces, either simple or reverberatory. Charcoal was long used in the operation of smelting, till at length necessity suggested the introduction of pit-coal; and in the second year of queen Anne, a patent was granted for smelting black tin with fossile coal in iron furnaces. The invention of reverberatory-furnaces built with brick, stone, sand, lime, and clay, soon followed this discovery; the form of which, being simple, has admitted of little improvement to the present time. The charge for one of the tin smelting-furnaces is from five to six hundred weight of black tin, well mixed with a tenth or twelfth or eighth its weight of culm, which is a species of coal from South Wales, that is very free from sulphur. The furnace is charged through a hole in its side with a shovel, and the tin levelled over the bottom with an iron rake or paddle. The apertures are then closed, and the fire raised to a very great strength, in which state it is left for four or five hours, when the door is taken off, and the whole charge well stirred together. The state of the metal is examined, and more culm thrown in if necessary; the furnace is again closed, and the fire kept up till the end of about six hours from its receiving the charge; when it is again examined, and if proper, it is then tapped, and the metal let out into a fixed basin made of clay, and large enough to hold somewhat more than the metal of the charge. The scoria in the bottom of the furnace is raked out at the mouth into a small pit made for this purpose, where it generally forms itself into a cake. When cold, it is carried to the stamping-mill, in order to separate the globules of melted tin disseminated through the scoria or slag. This, being broke by hammers to the size of goose-eggs, is put into the first stamping-mill, and passed through small iron bars; by which means the *pillion* (for so all tin recovered out of the slags is called) of the larger size is taken out and prevented from waste by too much stamping. The refuse of this first stamping is put into other stamping-mills of a second, third, or even fourth size. Of the pillion, separated from the scoria, all the rough or grainy parts are considered as metals, and refined accordingly, by being smelted without any flux, and the produce of this smelting refined, with the tin first tapped.

The tin in the basin, or float (as it is called), as soon as it comes down to a moderate heat, is laded out into the moulds, in slabs or pigs of about three-fourths of a hundred weight.

The method of smelting in Saxony and Bohemia, does not differ greatly from that practised in Cornwall. When the ore has been roasted it is washed upon tables, to separate

the oxyd of iron and the oxyd of copper, which are lighter than tin-ore. At Alt-Saint-John, the oxyd of tin is mixed with the black oxyd of iron: this is separated by a powerful magnet, which is drawn over the table. That the powdered oxyd of tin may not be blown away by the blast of the furnace, it is previously moistened with water; but as the flame always carries away a part of the ore, a chamber is constructed about the middle of the chimney, made of wood lined with clay, where the powdered ore that has been driven up by the flame is deposited.

The next process is that of *refining*. The furnace having, by the side of the small float now described, a larger one capable of holding twenty, or more blocks, is for this purpose suffered to cool to a certain degree, and then charged full with the slabs just mentioned, the tap-hole being kept open, so that as the tin melts in this moderate fire, it makes its exit through it into the float; where, while running out, it is frequently stirred and tossed by a ladleful at a time held arm-high, letting it fall in a stream into the mass of metal, when the scum which arises is taken off. While the metal already put into the furnace is melting, more is added, so as to be just enough to fill the float with good tin: and this, after being tossed and skimmed as before, and suffered to cool to a proper temper, is carried in iron ladles to moulds holding generally somewhat above three hundred weight (then denominated *block-tin*), where they are marked as the smelters chuse with their house mark, which may be a pelican, plume of feathers, stag, or horse, by laying brass or iron stamps, in the face of the blocks while the tin is in a fluid state, and yet cool enough to sustain the stamping iron. The blocks are then ready to be weighed, numbered, and sent to the nearest coinage town to be coined. The privileged towns for coinage of tin, were anciently Liskeard, Lostwithiel, Truro, and Helston: but soon after the Restoration, Penzance was added to the number; in which last place there is every quarter more tin coined than in the towns of Liskeard, Lostwithiel, and Helston, for a whole year. When the tin is brought to be coined, the assayer's deputy assays it by cutting off with a chissel and hammer a piece of one of the lower corners of the block, about a pound weight, partly by cutting and partly by breaking, in order to prove the roughness and firmness of the metal. If it is a pure good tin, the face of the block is stamped with the duchy seal, which stamp is a permit for the owner to sell, and at the same time an assurance that the tin so marked has been examined and found merchantable. The stamping of this impression by a hammer is *coining* the tin, and the man who does it is called the *hammer-man*. The duchy seal is argent, a lion rampant gules, crowned or, within a border garnished with bezants.

The drossy part remaining in the furnace is by an increasing fire wholly melted, which is then tapped into the small float, where the tin subsiding, and the dross rising to the top, the latter is taken off, and the tin laded into small slabs, as at first, to be again refined. The tin that remains in and about the scoria and dross of the last tappings, &c. is recovered by repeated smeltings, till at last, being almost entirely drained of that metal, they become what the workmen generally call *hard heads*, and esteemed of no farther value.

M. Groffe, in the Memoirs of the Academy of Sciences of Paris, has delivered a method he had invented of separating tin from lead or silver. Having tried an experiment on the scoria of metal, which contained with the tin a large quantity of silver, it seemed to him that one great step toward the separation of the silver, was the hastening of the calcination of the tin, and with this view he tried a mixture

of charcoal, saltpetre, and earth, which he put together into the coppel with the scoriz. It is easy to see that a detonation would happen from this, and this must greatly add to the force of the fire, in acting upon the scoriz, while the ferruginous matter well known to be contained in the charcoal mixed itself with the tin, and must greatly accelerate its calcination, divide its parts, and give the fire a new action over it. The consequence of this perfectly answered expectation, and recovered a large quantity of silver from the scoriz, in which the tin had before held it firmly imbedded; repeated experiments proved the truth of this observation, and it was found to be easy by this means at any time to separate silver from tin, or to purify silver without loss, by means of lead in which tin has accidentally been imbedded.

The scoriz in which tin is mixed with silver, are composed of tin half calcined, and run into an opaque vitrified substance, which forms a sort of net-work, in which the silver is confined in extremely small particles. If this is thrown into aqua fortis, the whole is dissolved: but then it requires a very strong fire to make the tin lose its metallic form; finally, if the whole is finely powdered, and then put into this menstruum, the silver only is taken up or dissolved, the tin remaining untouched at the bottom of the vessel.

The same gentleman found also a method of separating tin from silver, by means of corrosive sublimate of mercury. To conceive the manner in which this separation is effected, a piece of fine tin need only be cast into a solution of sublimate; in which case the acid of the sea-salt is seen to leave the mercury in order to fix upon the tin.

And, according to the same principle, if sublimate corrosive be added to a mixture of tin and silver, the same effect is produced, the acid affixes itself to the tin, and makes with it a butyrum joviale or butter of tin, the mercury becomes dissipated in the mean time by the action of the fire, and the silver remains pure and alone; but in this experiment, if too much corrosive sublimate be added, there is danger of losing some of the silver; since the abundant acid will prey upon and carry off a part of that metal, making a sort of luna cornea which dissipates itself in the air, or if the operation be performed in a close vessel, a butyrum lunare.

Gold may also be purified from tin in this manner, and in this there is no risk of loss, since the acid which takes up the tin has not the least power over that metal: in all these processes, however, the operator must avoid the fumes issuing from the crucible, for they are very dangerous.

These methods of separating of tin from silver are very certain and infallible, but they are too expensive to be employed in common, and in larger works.

The separating of tin from lead to be employed in the refining of silver is a matter of great importance; and this may be done in the following manner: melt the lead, and when in fusion throw into it a quantity of filings of iron, then increase the fire to a considerable degree, and the surface of the metal will be covered with a sort of scum, which is no other than the iron and tin. At this time there should be a little alkali salt thrown in, and by this means the scoriz readily separate themselves, and the pure lead remains in form of a regulus at the bottom. The same method may be used to separate tin from silver in the larger way, but it will be necessary for this purpose to add some lead, since otherwise the fusion will be very slow and difficult, and the tin will calcine without separating from the silver. This is a very easy and very cheap method, and will obviate most of the mischiefs which happen to the refiners, of which they would have much less frequent reason to complain, if they

nically examined the lead they were to employ. But if gold or silver be mixed with tin, the shortest method in small quantities is to calcine the whole very briskly, and in order to complete the vitrification and separation of the tin, to cast in a little glass of lead, which will immediately join itself with it and carry it off from the mass.

It may seem singular that iron being one of the hardest of the metals to melt, and tin being of all the easiest, they should so readily and easily unite in these experiments; but this seems to be the result of one of those natural and unexpected alliances which accident frequently discovers to us in bodies. There is one conjecture, however, that may be worthy a place in this research, which is, that all tin-ore contains a quantity of arsenic; and it is well known that iron very readily mixes with arsenic, and is employed to separate the arsenic from other ores, and a regulus may be formed of arsenic and iron. It is easy to suppose that tin is, in its metalline form, not wholly divested of the arsenic it contained when in the ore; and if this be allowed, it is no wonder that the two metals are easily brought together by the mediation of that principle. *Memoirs Acad. Scienc. Par. 1737.*

Mr. Cramer gives the practical rules of separating silver from tin, thus: Divide one center of tin into two equal parts; put each of these into a separate test, and add to each sixteen centers of granulated lead, and one of copper; put the whole under the muffle, and make a very strong fire; the tin will be calcined immediately, and will swim upon the lead. Then diminish the fire a little, till the ashes of the tin that swim upon the surface do no longer sparkle: when you see this, add with a ladle two centers of glass of lead to each test, in such a manner that it may be spread wide over the whole surface of the rejected calx; the calx will then change its form of powder into that of glass; then increase the fire to its highest degree, stir up the whole with an iron rod made warm; and when the scorification is perfected, pour out the glass into a mould; the scoriz being separated, put both the reguluses into two coppels well heated; and into a third put sixteen centers of lead, and one of the same copper used in the process: examine all these beads after the coppelling is over; if the two first weigh exactly alike, it is a proof the process has been well performed; and subtracting the weight of the bead, separated from the third pan, from the joint weight of the other two, the remainder is the weight of the pure silver contained in the quantity of tin which was examined. *Cramer's Art of Assaying, p. 228.*

Tin is found in Europe, Asia, and America, but has not hitherto been discovered in the continent of Africa. This metal is much less generally disseminated than gold, silver, iron, copper, or lead; but where it occurs, it is most frequently in large quantities. In Asia it is found on the coast of Sumatra, and in Siam and Pegu. It is principally imported into our Indian possessions from Queda, Junkfeilon, Tavai in Lower Siam, and the island of Banca. The tin-mines of Banca are said to be of great extent; and Mr. Ellmore informs us, that no less than from forty to sixty thousand peuls of tin are furnished by these mines annually. Tin is said also to be found at a place five days' journey from Nankin in China. The Indian tin was known to the ancients. Diodorus Siculus mentions it among the productions of India. Tin-stone is found in Mexico in the state of stream-tin, and is procured from alluvial depositions by washing. It is also said to occur in Chili.

Tin-ore occurs in Saxony and Bohemia in beds, and disseminated in granite rocks; it is found also in veins in rocks of granite, gneiss, and mica-slate. Alluvial depositions of tin are also met with in these districts. The mines sometimes consist of a mass of ore formed by the junction of a multitude

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of small veins which pass through the rocks in different directions. These veins also contain topazes. Brongniart *Traité Elementaire*.

Tin is found near Monterey, in the province of Galicia in Spain, in veins which traverse granite and mica-slate. This ore has recently been discovered in small quantities in grains and crystals, in a rock of granite at Puy les Vignes, in the vicinity of St. Leonhard, in the department of Haute-Vienne in France. It occurs in veins with wolfram, arsenical pyrites, and martial arseniate of copper.

The most considerable repository of tin-ore in Europe is that of Cornwall. The greatest part of the tin consumed in Europe is procured from thence; and Camden even supposes this abundance of tin in Cornwall and Devonshire, to have given the original denomination *Britain* to the whole kingdom. In the Syriac language, *varatanac*, or *baratanac*, signifies *land of tin*; from which Bochart derives the name *Britain*. It occurs in Cornwall, both in veins and alluvial depositions, in various parts of the county. Alluvial depositions of this ore are also met with on Dart-moor, in Devonshire. The veins which contain tin intersect both granite and slate rocks; the latter are provincially called *killas*. These veins vary in width, and sometimes contain large masses of the ore. One block was raised from the mine called Polberrow, in St. Agnes, which weighed more than twelve hundred pounds, and produced more than half that weight of pure metal. Tin-stone generally occupies the upper part of veins, and is succeeded by copper-ore; but there are instances of tin occurring at the depth of two hundred fathoms. Different modifications of the forms of the crystals are peculiar to certain veins. Crystals of tin-stone are also disseminated in some of the granite rocks in the vicinity of veins: the crystals appear to occupy the place of mica. Where the tin-stone is disseminated in slate, it is generally in small strings or minute veins. See *MINE* and *VEINS*.

The workmen distinguish several kinds of tin; as *moor-tin*, which is the best sort, a fool of which weighs eighty pounds; and *mine-tin*, which is the next, the fool of it weighing about fifty-two or fifty pounds. The tin got from the soft, gravelly earth, they call *pryan-tin*, to distinguish it from that obtained from the stones, which is better by almost half. See *STREAM-Tin Ore*.

*Grain-tin* denotes the ore of tin that is sometimes dug very rich in the form of grains or pebbles, or else in larger pieces, composed of many such distinct grains, united in one mass, always of a black or dark rosin colour, pointed like diamonds. Grain-tin is also used to signify the purest and finest block or white tin, smelted with charcoal in the blast or blowing-house furnace, which never had any brood or foreign mixture in the mine: whereas the mine-tin is usually corrupted with some portion of mundic, or other mineral, and is always smelted with a bituminous fire, which communicates a harsh sulphurous quality to the metal. Grain-tin is peculiarly produced from stream-work, and is worth several shillings per hundred more than mine-tin. See *STREAMING*.

See on this article Macquer's *Chem. Dict.* art. *Tin*; and Pryce's *Mineralogia Cornubiensis*, fol. 1778.

There is a curiosity in the Cornish mines, which is this: that in digging at the depth of forty or fifty fathoms, they frequently meet with large timber, still entire.

Childrey, in his *Natural History*, goes back as far as the deluge to place them there; but, without having recourse to so great antiquity, they who believe that the mines, when exhausted of their ore, or mineral matter, renew and fill again in course of time, will soon solve the difficulty, by supposing

that, in the first working of these mines, these timbers had been let down to serve as props and pillars.

But there are other people who will think this renewal of the mines itself a difficulty as great as the former. However, what the former author adds, *viz.* that in some places in the mines they likewise find pick-axes, &c. with wooden shafts, as also brass nails, and that even a medal of Domitian has been found in one, seems to countenance the opinion.

For the use of tin in the composition of pewter, see *PEWTER*.

*Tin-Trade of Britain.* That tin was procured from Britain in a very early age, appears probable from the concurrent testimony of the most ancient historians. The Phœnicians are said by Strabo to have passed the pillars of Hercules, now the straits of Gibraltar, about twelve hundred years before Christ. At what precise period they discovered the Cassiterides, or Tin islands, is unknown, nor is their exact situation determined; but it is generally believed that the Scilly islands, and the western part of Britain, were the places from whence these early navigators procured the tin which they exported to other countries. The Phœnicians were extremely anxious to conceal from the rest of the world the true situation of the Cassiterides. Herodotus, who wrote about four hundred and fifty years before Christ, could not learn where these islands were situated; but he supposed that tin, like amber, was brought from the remotest parts of Europe. Strabo relates, that the captain of a Phœnician vessel returning from Britain seeing himself pursued by a Roman galley, chose rather to run his vessel among the rocks, than the Romans might experience the like fate, than be the means of discovering so valuable a commerce to the enemies of his country. The captain having escaped from the wreck, claimed from his country compensation for the loss of his vessel and the cargo; and it is said he was paid from the public treasury the amount of his claims. By these precautions, the Phœnicians are said to have enjoyed a profitable trade to these islands for about three hundred years. The secret was at length discovered, and the Greeks, Gauls, and Romans, came in successively for a share of this trade. The Phœcean Greeks established a colony at Marseilles five hundred and forty years before Christ; and after the destruction of Carthage, carried on this commerce: they endeavoured to conceal from the Romans their knowledge of the British isles; for on being questioned by Scipio respecting the situation and extent of those isles from whence the tin was brought, they declared that they were entirely unknown to them. The Phœnicians, in their voyage to Britain, are said to have sailed from Cadiz to the harbour of the Artabici, near Cape Finisterre, from whence, after four days' sail, they arrived in Britain. Strabo relates, that Publius Lucius Crassus having made fruitless attempts to discover whence the tin was brought, at length succeeded, and arrived in Britain. It is uncertain when this Crassus lived, and even who he was, there being two of this name; the father, who was præsul of Spain, and the son, who had a command under Cæsar in Gaul.

Diodorus Siculus, who wrote during the time of Augustus, appears, from the quotation which we shall subsequently give, to have been well acquainted with the tin-trade of Britain at that period. There cannot be a doubt, that from the conquest of Britain by the Romans, to the decline of their empire in the West, they enjoyed the undisturbed possession of the British tin-trade.

What the ancient method was of preparing tin for the furnace we cannot learn, says Dr. Borlase. Polybius the historian is said to have described it; and that work is commended.

mended by Strabo, but now lost. The short description of the tin-trade given by Diodorus Siculus deserves particular attention. "These men (the tanners) manufacture the tin by working the grounds which produce it with much skill. For though the land is rocky, it has soft veins running through it, in which the tanners find the treasure, which they extract, melt, and purify. Then shaping it by moulds into a cubical figure, they carry it off to a certain island lying near the British shore, which they call Ictis; for at the reefs of the sea between the island and the main land, the passage being dry, the tanners embrace the opportunity, and carry the tin over in carts to the Ictis or Port; for it must be observed, that the islands which lie between the continent and Britain have this peculiarity, that when the tide is full they are real islands, but when the sea retires they are so many *peninsulæ*. From this island the merchants bring the tin of the natives, and export it into Gaul; and finally through Gaul, by a journey of about thirty days, to the mouth of the Rhone:" lib. 4. Pofidonius, as quoted by Strabo, says the port to which tin was brought in the south of France was Marfeilles.

To what uses the nations of antiquity applied all the tin which they obtained with so much labour from Britain, is not precisely known. The Phœnicians were celebrated for their skill in the art of dyeing; and the Tyrian purple, which was either a bright crimson or a scarlet, was held in the highest estimation; hence it has been conjectured, with much probability, that the Phœnicians were acquainted with the use of the solution of tin in the preparation of that colour. In the modern art of dyeing scarlet or crimson, the solution of tin in the nitro-muriatic acid is essentially necessary to communicate those colours to woollen cloths or stuffs, a practice which is probably derived from the ancient manufactures of the East.

The mirrors of the civilized nations of antiquity were made of a composition of copper and tin. The most ancient account that we have of these mirrors is that in Exodus, chap. xxxviii. 8. "And he made the laver of brass (a mixture of copper and tin), and the foot of brass of the mirrors of the women." The Jewish women probably received these mirrors from the Egyptians when they left the country; for it was the custom of the Egyptians to carry a mirror in their left hand, when they went to their temples. Cyril de Ado.

Pliny says that the best specula were anciently made at Brundisium of copper and tin. The metallic mixture of tin and copper, for rendering the latter metal white, is mentioned by Aristotle. (*De Mirab.*) This composition is still in use for the specula of reflecting telescopes. (See *SPECULUM*.) The ancients also made use of an alloy of tin with copper and lead for pot-metal. In the time of Pliny, pot-metal, *ollaria temperatura*, was made of two pounds of lead, and an equal quantity of tin, mixed with one hundred pounds of copper. From the same writer we learn, that the bronze of which the Romans made their statues, and the plates on which they engraved their inscriptions, was composed of one hundred pounds of copper, mixed with twelve pounds and a half of an alloy made of equal parts of lead and tin. He informs us also that tin, *plumbum album*, was employed in coating or tinning copper vessels, to render them more wholesome; and it appears that the Romans not only used pure tin, but the same mixture of tin and lead which some of our workmen use at this time in tinning of vessels. A mixture of equal parts of tin and lead they called *argentarium*; a mixture of two parts of lead and one of tin they called *tertiarium*; and with two parts of tin and

one of lead, they tinned whatever vessels they thought fit. (Watson's Chemical Essays, vol. iv.) In the manufacture of arms, the ancients used an alloy of tin with copper, their brass being a composition of these metals; but by what method they were enabled to communicate to it the necessary degree of hardness is unknown.

What was the relative value of tin, compared with that of gold and silver, as estimated by the Phœnicians, the Greeks, or the Romans, is uncertain.

The process of extracting tin from its ores was probably very imperfect, and remained so in this country to the time of Elizabeth, when Carew informs us that sir Francis Godolphin introduced great improvements in the tin-works.

The reverberatory-furnace appears, from Dr. Borlase, to have been introduced into Cornwall about the beginning of the last century; and about the same time the introduction of pit-coal became general, the wood of the country having been nearly exhausted. Sir Bevil Granville had previously made many experiments for melting tin with pit-coal, but without success, when the ore was smelted at the blowing-houses by large bellows worked by a water-wheel.

Whether the Phœnicians or the Greeks interested themselves in the management of the tin-mines, or whether they were simply merchants purchasing and exporting the tin, is uncertain. It appears, however, by the passage quoted from Diodorus Siculus, that the veins of tin-ore were worked as mines; though it has been, and is still generally believed, that stream-tin was the only ore worked by the ancients. From the testimony of Strabo, Pliny, and others, the Romans not only traded to Britain for tin, but improved the art of mining in Cornwall. The Romans being the conquerors, and the British under them having probably little or no property, they were the working miners, but under what regulations is uncertain. The Saxons did not obtain possession of Cornwall till the reign of Athelstan, and neither they nor the Danes appear to have directed their attention to the mines. After the Norman conquest, the working of mines is said to have yielded great profit. In the time of king John, however, the right of working tin being as yet, says Borlase, wholly in the king, as earl of Cornwall, the property of the miners was precarious and unsettled, and all the tin that was raised was engrossed and managed by the Jews. The *tin-farm* of Cornwall at this time amounted to no more than one hundred marks, according to which valuation, the bishop of Exeter received then, and still receives from the duke of Cornwall, the annual sum of 6*l.* 13*s.* 4*d.*, so low were the tin profits then in Cornwall; whereas in Devonshire, the tin was then farmed at 100*l.* yearly. King John, sensible of the languishing state of the mines, granted the county of Cornwall some privileges, and is said to have also granted a charter to the tanners.

In the time of Henry III. the tin-mines of Spain, which had been worked by the Moors, were stopped, and Cornwall had all the trade of Europe for tin. In the eighteenth year of Edward I., the Jews being banished the kingdom, the mines were again neglected for want of proper encouragement to labour, and security to enjoy and dispose of the products. In consequence of a petition from some Cornish gentlemen to Edmund, earl of Cornwall, a charter was obtained with more explicit grants of privileges of keeping courts of judicature, and managing and deciding stannary causes. About this time, says Borlase, it appears that the rights of bounding or dividing tin grounds into separate portions, for encouraging the search for tin, were more regularly adjusted, and various laws introduced for the protection of the miner.

In the thirty-third year of Edward I. the above charter seems to have been confirmed, and the tanners of Cornwall were made a distinct body from those of Devonshire, before which time the tanners of both counties were accustomed to meet on Hingston-Hill every seventh or eighth year, to concert the common interest of both parties. Two coinages of tin yearly were also granted by this charter, and the tanners had the liberty of selling their own tin, unless the king insisted on buying it himself. Other laws and regulations for the encouragement and protection of the miners, were passed in the reigns of Edward III., Henry VII., and Elizabeth. The mines having been much neglected during the reign of Mary, Elizabeth invited German miners into the country, and great encouragement was given to mining operations in Cornwall, and various parts of England. The quantity of tin procured annually in the succeeding reigns of James I. and Charles, amounted to sixteen hundred tons. During, and for some time after the civil wars, the tin-trade declined, but revived again in the reign of George I., and has since been increasing. For an account of the annual products of the tin-mines of Cornwall and Devonshire, see the article *MINE*.

All the transactions connected with the tin-mines are under the controul of the stannary laws: courts are held every six months, and they decide by juries of six persons, with a progressive appeal to the lord warden and lords of the duke of Cornwall's council. By whatever method or accident a vein is discovered, permission of the proprietor must be obtained before any operations can be commenced, except in the case of such tin-mines as are anciently embounded according to the provision of the stannary laws. (See *STANNARY COURTS*.) The owner of the foil is technically called the *lord*, whose share (which is called his *disb*) is generally one-sixth or one-eighth of the ore. The duke of Cornwall receives a duty of four shillings *per* hundred weight of tin, which is taken when the tin is assayed and licensed: this process is called the *coinage*, from the French word *coin*, a corner. A corner is chipped off each block at the office, and if it be found sufficiently pure, the blocks are stamped with the arms of the duke. The annual revenue of the tin is about 10,000*l.*; the average annual amount being about 3200 tons, and the value about 120*l.* *per* ton. The mode of assay is obviously rude and imperfect; and we have heard that foreigners have recently complained that the British tin was not so pure as that obtained from the East. But whatever be the purity of British tin, there can be no doubt that it is greatly adulterated on the continent. It is said that every tin-founder in Holland has English stamps, and be the quality of the tin what it may, the inscription makes it pass for English. The metal with which British tin is adulterated on the continent is lead, which being five times cheaper, and when mixed in small quantities not easily detected, the temptation for such fraud is great. It is not true, as asserted by some foreign writers of respectability, that British tin is purposely alloyed with certain portions of copper and lead before it is exported from Cornwall. The ores of tin, in the tin-mines of Cornwall, are so intimately associated with portions of copper-ore, lead-ore, arsenical pyrites, and other metals, of which a small mixture will remain in the block-tin, and can only be separated by subsequent refining, that any considerable portion of alloy may be detected by the increase of specific gravity. Grain-tin, which is the purest tin of commerce, is smelted from the finest ore by a charcoal fire: the common block-tin is smelted with pit-coal or culm, as

before stated. Grain-tin is used for various purposes in the arts, where tin of the purest quality is required.

Long as the tin-mines of Cornwall have been worked, they still continue to supply in abundance this useful metal; but from the greater extent of the present works, and from the circumstance of tin always occupying the upper part of the vein, we may infer that the tin-mines of that county will be exhausted at no very distant period. At present, the principal part of the tin is obtained from the western extremity of the county; but when the tin-mines in that district are worked out, we may consider the tin-trade of Cornwall as nearly extinct. The granitic range of Dartmoor, in Devonshire, has been less explored than Cornwall; but there is reason to believe that the metallic repositories of tin and copper which it contains will furnish an ample field for the industry of future adventurers, and a failure in the supply from Cornwall would greatly enhance the price of this metal, and give increased spirit to mining speculations.

*TIN*, in *Chemistry* and the *Arts*. The colour of tin is white, like that of silver: it has a sensible taste, and when rubbed, emits a peculiar smell: its hardness is greater than that of lead, and less than that of zinc: its specific gravity is stated by Briffon to be 7.291, and it is said to become a little greater by hammering: it is very malleable, and may be beaten into very thin leaves. *Tin-foil*, as it is termed, is usually about  $\frac{1}{1000}$ th of an inch in thickness; but this is by no means the utmost degree of thinness which it will bear. Its ductility and tenacity are rather low: a tin wire,  $\frac{1}{12}$ th of an inch in diameter, is stated by Muschenbroeck (as quoted by Dr. Thomson) to be capable of supporting a weight of 31 lbs. only, without breaking. Tin may be easily bent, and when bent, produces a peculiar crackling noise: it fuses at about 442° of Fahrenheit's scale, and will bear a most intense heat before it is volatilized. On being exposed to the atmosphere, its surface becomes slightly tarnished, but it undergoes no other change. When kept under cold water it undergoes no change; but red-hot tin, exposed to the vapour of water, decomposes it, an oxyd of tin is formed, and hydrogen gas is evolved. Exposed to the action of the air in a melted state, it quickly becomes covered with a greyish powder, or oxyd; and if the heat is very violent, it is stated to take fire, and to burn with a pale white light.

Tin unites with oxygen in two proportions, as has been lately proved by Gay Lussac, in opposition to Berzelius, who concluded from his experiments that there were three oxyds of tin. (See *Annal. de Chimie et Phys.* vol. i. p. 40.) The first oxyd, or protoxyd, of tin, consists of about

Tin	-	-	100.
Oxygen	-	-	13.6

The second, or peroxyd, of about

Tin	-	-	100.
Oxygen	-	-	27.2

This gives the weight of the atom 7.352. Dr. Thomson is inclined to consider it as 7.375; but it perhaps will be found hereafter either 7.25 or 7.5. The first of these oxyds may be formed by dissolving tin in muriatic acid, either by means of heat, or by adding occasionally a little nitric acid: when dissolved, add to it a solution of potash; a white precipitate falls, which is partly taken up again; but the remainder, on standing, assumes a dark grey colour, and even a metallic lustre; and on being heated to whiteness, is pure protoxyd of tin. The peroxyd may be formed by boiling

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boiling the protoxyd in dilute nitric acid, drying by evaporation, and heating to redness.

Tin forms likewise two combinations with chlorine. When tin is burnt in chlorine, a very volatile clear liquor is formed, a non-conductor of electricity, and which, when mixed with a little water, becomes a solid crystalline substance, a true muriate of tin, containing the peroxyd of tin. This compound has been called the *smoking liquor of Libavius*, from its discoverer, who formed it by distilling together amalgam of tin and corrosive sublimate. According to the experiments of Dr. John Davy, it consists of two atoms or proportions of chlorine united to one of tin; or of about

Tin	-	-	100.
Chlorine	-	-	121.82

*Prochloride of tin*, first described by Dr. J. Davy, is a grey, semi-transparent, crystalline solid, and may be formed by heating together amalgam of tin and calomel. According to the same chemist, it consists of one atom or proportion of chlorine united to one of tin; or of about

Tin	-	-	100.
Chlorine	-	-	60.72

Tin combines readily with sulphur and phosphorus, but not with hydrogen, azote, carbon, or boron.

There are two sulphurets of tin; the first may be formed by fusing tin and sulphur together: it is of a bluish colour, and lamellated structure; and from the experiments of Dr. J. Davy, consists of one proportion of tin united to one of sulphur. The other sulphuret of tin is made by heating together the peroxyd of tin and sulphur. It is of a beautiful gold colour, and appears in fine flakes. It was formerly called *aurum musivum*, and various complicated processes given for forming it. Pelletier and Proult investigated its nature, and concluded it to be a compound of oxyd of tin and sulphur; but Dr. Davy has shewn that this is not the case, and that it consists merely of one proportion of metallic tin united to one proportion of sulphur.

The phosphuret of tin may be formed by heating the two substances together. Only one phosphuret is known: it has a metallic appearance, and is so soft that it may be cut with a knife. When gently heated in the air, the phosphorus takes fire. According to the experiments of sir H. Davy, it contains about 17 per cent. of phosphorus, and consists therefore of one atom or proportion of phosphorus united to one of tin.

Tin combines with most of the metals, and some of its alloys are much employed.

Its alloys with the metals of the fixed alkalis speedily tarnish in the air, and effervesce in water.

It readily unites with gold by fusion, and was formerly supposed to have the property of rendering this metal brittle; but this has been more recently denied. An alloy of 11 gold and 1 of tin, was found by Mr. Hatchett to have a pale whitish colour, brittle when thick, but when cut thin, capable of being bent easily. Its fracture was fine-grained, and of an earthy appearance. Mr. Alchorne found, that gold alloyed with no more than  $\frac{1}{2}$ th of tin, retains its ductility sufficiently to be rolled and stamped in the usual manner. But Mr. Tillet shewed, that when heated to redness, the tin melts, and the alloy falls to pieces.

Its alloys with platina, according to Dr. Lewis, are brittle and dark-coloured, when the two metals are in equal proportions. The alloys of tin and silver are very hard and brittle. The alloys, or rather amalgams, of tin and mer-

cury differ in hardness, according to the proportions in which the two metals are mixed: three parts of mercury and one of tin form an amalgam which crystallizes in cubes, or, according to Sage, in the form of brilliant square plates, thin towards the edges. Tin readily combines with copper, and forms alloys exceedingly useful for a variety of purposes, as will be briefly noticed when we speak of the uses of this metal. Tin does not readily combine with iron, but their union may be effected by fusing them together in close vessels: it combines with zinc by fusion, and the alloy is harder than zinc, and stronger than tin: with lead it readily unites in all proportions, and the lead by the addition becomes considerably harder.

The oxyds of tin are capable of combining with the alkalis, and of forming with them peculiar compounds.

*Salts of Tin.*—Tin is oxydated and dissolved by many of the acids, and forms salts, differing in their nature according to the degree of oxydization of the metal.

*Nitrates of Tin.*—Concentrated nitric acid (specific gravity 1.48) poured on tin, exerts but little action upon it; but if a little water be added, a violent action is exerted, and peroxyd of tin is formed, which separates in the form of a white powder, this oxyd being apparently incapable of combining with nitric acid: in this case, both the acid and the water are decomposed, and nitrate of ammonia is formed; but if the acid be diluted, and care be taken to moderate its action upon the metal, the water only is chiefly decomposed, and the protoxyd of tin is formed, which combining with the nitric acid, forms a solution of a yellow colour, which is a real nitrate of tin. Still, however, a little nitrate of ammonia is formed, and the nitrate of tin itself is not permanent, the metal continuing to pass to the state of peroxyd, and gradually separating. The same change is produced by heating the solution, a precipitate being deposited, which, however, is partly subnitrate of tin.

*Muriates of Tin.*—We have already spoken of the chlorides, or compounds of tin with chlorine. Now if water be added to these chlorides, they are converted into muriates of tin. The muriate of tin, in which the metal is in the state of protoxyd, may be formed, however, by dissolving tin in about four times its weight of muriatic acid: hydrogen escapes, and the solution has a brownish-yellow colour, and yields, on evaporation, small needle-shaped crystals, soluble in water, and somewhat deliquescent. Water poured upon it in small quantity decomposes it, and converts it into a submuriate, which is precipitated, and a super-muriate, which remains in solution. A similar effect is produced by the alkalis, when not added in excess. This muriate of tin, formed of the protoxyd, has a great tendency to combine with oxygen, and to pass into the state of muriates with the peroxyd, and this property enables it to exert many curious efforts upon other metallic salts. Thus, for example, the red oxyd of mercury, the black oxyd of manganese, the white oxyd of antimony, the oxyds of zinc and silver, are deprived of their oxygen by this salt, and reduced to the metallic state. The muriate of tin with the peroxyd of the metal may be formed as before mentioned. It is capable of crystallizing, and possesses properties quite different from those of the muriate above described. It is much used by dyers, who generally form it by dissolving tin in nitro-muriatic acid.

*Sulphate of Tin.*—Sulphuric acid, when cold, has little action on tin, but assisted by a moderate heat, it attracts oxygen from it; sulphurous acid gas is evolved, and a sulphate of tin is formed, which yields, when evaporated, small needle-formed crystals. It is probable there are two sulphates

sulphates of tin, though their properties do not appear hitherto to have been distinctly defined.

The *phosphate*, *fluat*, and *borate of tin* may be formed by double decomposition, by adding solutions of their alkaline salts to a solution of muriate of tin. They are all insoluble compounds, and have been but imperfectly examined. No *carbonate of tin* appears to exist.

The other salts of tin are unimportant, and but little known. The *acetate* has been most investigated: it may be formed by boiling tin in acetic acid. The solution has a whitish colour, and yields crystals by evaporation. There appears, however, to be another *acetate*, (formed probably with the peroxyd of the metal,) that does not crystallize, but is capable of existing only, on evaporation, in the form of a gummy mass.

*Uses of Tin and its Compounds.*—Tin and its compounds are extensively used in the arts. We shall here briefly point out some of the more important operations in which they are concerned, referring our readers for further particulars to the different articles themselves. An amalgam of tin and mercury forms the metallic coat of glass mirrors. For the method of performing this operation, see the article *SILVERING of Mirrors*.

The compounds of tin with copper are very important. Of this alloy *cannons* are made, also *bell-metal*, *bronzes*, and the *mirrors* or *specula of telescopes*. For these different purposes, the two metals are mixed in different proportions, which are pointed out more particularly under their respective articles.

Vessels of copper, especially for culinary purposes, are usually covered with a thin coating of tin, to prevent the copper from oxydating. (See the article *TINNING*.) Thin iron plates covered with this metal, form what is known by the name of *tin-plate*; which see.

The oxyd of tin, mixed with that of lead, forms *putty*, which is much used in polishing metals. See *PUTTY* and *SPECULUM*.

Tin alloyed with lead forms *folder*; which see.

Of the salts of tin, a solution of the *muriate*, or *dyers' liquor*, as it is termed, is used as a mordant in dyeing scarlet. See the articles *DYEING*, *MORDANT*, and *RED*.

The solution of tin in aqua regia, added to the tinctures of cochineal, of gum-lac, and of some other red tinctures, heightens the colour of these, and changes it from a crimson or purple to a vivid reddish-yellow, or fire-coloured scarlet. The new scarlet, or Bow dye, is obtained in this manner; and it is said, that our most beautiful and lasting-coloured fine cloths owe their superlative excellence to the retentiveness given by our fine grain-tin; inasmuch, that the English superfine broad-cloths, dyed in grain by the help of this ingredient, are become famous in all markets of the known world.

Mr. Pryce apprehends, that the purple dye of the Tyrians owed its reputation wholly, or in part, to the use of our tin in the composition of their dye-stuff, as the tin-trade was solely under their own direction.

This colour, however, succeeds only with wool and other animal matters. Attempts have been made, but without success, to give this colour to thread, to cotton, and even to silk, though this latter substance has many properties of animal matters. The solution of tin made with marine acid alone, or with vitriolic acid, does only give to red tinctures a crimson colour, as alum does. Vegetable acids, as vinegar and cream of tartar, are also capable of dissolving tin.

Tin or its compounds are not used in medicine. They do not appear to be of a poisonous nature; but the muriate of tin, taken into the stomach in considerable quantity, speedily induces death, apparently merely from its corrosive qualities.

It was formerly recommended for its anthelmintic virtues; but it is possible, says Dr. Lewis, that these may proceed not so much from the pure metal, as from a certain substance of a different or arsenical nature, of which the purest sorts of tin are found to participate.

The principal preparations of tin are as follow:

*TIN, Butter of*, is a name given by some chemists to a combination of tin with the concentrated marine acid of corrosive sublimate. It is procured by reducing these substances into small parts, and mixing them together: this mixture will, by degrees, be moistened by attracting the humidity of the air. The decomposition of the corrosive sublimate by the tin is more speedily effected by distillation.

*TIN, Calx of*, is the metal reduced into powder, either by means of fire, or by being dissolved in an acid menstruum, and precipitated with an alkali.

*TIN, Ceruss of*. See *Spanish WHITE*.

*TIN, Diaphoretic of*. See *ANTIHECTICUM Posterii*.

*TIN, Flowers of*, are a kind of white cosmetic, or paint for the complexion, drawn from tin with sal ammoniac, by means of sublimation.

*TIN, Gold-coloured preparation of*, is made by adding six ounces of mercury to twelve of melted tin, pulverizing the cold mass, mixing with it seven ounces of flowers of sulphur and six of sal ammoniac, and subliming in a matrass.

This preparation is called *aurum mosaicum*, and as a medicine is little regarded, though formerly much esteemed against hysterical and hypochondriacal complaints, malignant fevers, and venereal disorders. Upon experiment, it appears to be little more than calx of tin.

*TIN, Salt of, Sal Jovis*, is prepared from twelve ounces of calx of tin, and four of aqua regia, diluted with twenty-four of water: after digestion for two days, the vessel is to be shaken, the more ponderous part of the calx suffered to settle, the turbid liquor poured off, and evaporated almost to dryness, and the mass farther exsiccated on brown paper: to the remaining calx half the quantity of fresh menstruum is to be added, and the process repeated. Dr. Lewis's experience has not enabled him to pronounce on the virtues of this salt, which is in taste very sharp and corrosive: he thinks it needless to calcine the metal, as tin uncalcined dissolves much more easily and plentifully, and the solution is in both cases the same. According to Hoffmann, the solution of tin is a strong purgative. Lewis's Mat. Med.

TIN is also a word used by some of the chemical writers to express sulphur.

*TIN-Coping*, in *Rural Economy*, a sort of covering of this kind of metallic substance in the sheet form, which is not unfrequently employed on the upper parts of the frames, stands, or staddles of corn-stacks, for the purpose of preventing destructive vermin from entering or getting into them. It is a cheap, ready, convenient, and useful material in this intention, in many cases, which the arable farmer should not be inattentive to in his stack-yard.

*TIN-Floors*, a contrivance used by our husbandmen who propagate hops, to dry them after the gathering. See *OOST*.

It is thus done: Let a square brick room be built, with a door on one side, and a long fire-place of a foot wide in the middle, reaching almost across it; let holes be made at the sides of this fire-place, to let out the heat into the room; and at the height of five feet above this, let a floor be made of laths of an inch thick, laid lattice-wise. Let this be covered with great plates of double tin, taking care that the joinings of the tin be well foldered, and lie upon the laths, nor over the interstices, which may be about four inches wide. Let a row of boards be fitted round the edge of

this floor, to keep the hops from falling off; then lay on a covering of hops of a foot thick, and make a small fire of charcoal in the mouth of the fire-place, and the hops will dry very quickly and very regularly. They may be continually stirred about while drying, and, when dry, a part of the boarded edge of the kiln may be taken down, and the dried parcel thrust out, and a fresh parcel laid on in their place. A very small quantity of fuel is sufficient in this way, and any fuel will do, for the smoke never comes at the hops. There is a very great improvement still upon this method of drying hops, used by some people: this is the making of a wooden cover, of the size of the tin-floor; this is covered with plates of tin nailed on, and is suspended over the kiln in such a manner, that it may be let down at pleasure, when the lower parts of the hops are dry. This is to be let down within ten inches of their surface, and there it acts as a reverberatory, and drives back the heat on the upper ones, so that they are dried as soon as the lower ones. Thus all the trouble of turning is saved, and the hops are much better dried than in any other way. Mortimer's Husbandry, p. 186. See VENTILATOR.

**TIN-Foil.** See FOIL, FOLIATING, and LOOKING-GLASS.

**TIN-Hatch,** in Mining, a term used by the people of Cornwall, to express the opening into a tin-mine. They also call it *tin-shaft*.

They make several openings in the sides of the hills where they expect veins of ore to be. All these, except that which opens on the head of the mine, are called *essay-hatches*; but that which does so, is made their entrance afterwards, and changes its name to that of the tin-hatch. See HATCHES and SHAFT.

**TIN-Hoop for Cheese,** in Rural Economy, a light thin hoop constructed of this sort of sheet metallic substance, that is sometimes employed in cheese-making, for holding and keeping the curd together while it is breaking and being crumbled down into the filling-vat, in order to prevent the trouble of raising and holding up the corners of the cloth which is made use of in the business. It is usually about nine inches in breadth, and formed so as exactly to fit the top part of the cheese-vat on which it rests when used. These hoops are sometimes made of other materials, as wood, &c. and are useful in saving time and trouble.

**TIN-Ore,** called *tin-stuff* by the miners in Cornwall. See TIN-Stone.

M. Gellert directs, that ores of tin should be assayed in the following manner: Mix a quintal of tin-ore, washed, pulverized, and twice roasted, with half a quintal of calcined borax, and half a quintal of pulverized pitch; these are to be put into a crucible, moistened with charcoal-dust and water, and the crucible placed in an air-furnace: after the pitch is burnt, give a violent fire during a quarter of an hour, and then withdraw the crucible. If the ore be not very well washed from the earthy matter, as it ought to be, a larger quantity of borax is requisite, with some powdered glass, by which the too quick fusion of the borax is retarded, and the precipitation of the earthy matter is prevented. If the ore contains iron, to the above mixture may be added some alkaline salt. See MOOR-Stone.

The method of assaying tin-ore, says Mr. Pryce, is very easy; for in its form and size of black tin (which is the ore dressed by stamping, several washings, and calcination, if mineralized with vitriolic, arsenical, or sulphureous pyrites) great part of the work is done, and little more remains than fusion, which is accomplished by a red heat in the following process: Take four or five ounces of black tin as emptied from the sacks, mix it well with about one-fifth part of its weight of powdered culm; put the mixture in a black-lead

crucible, on the wind furnace, and, in about twenty minutes, the metal will be found precipitated to the bottom of the crucible, the culm and scoria floating on the tin. On the surface of this matter there will be globules of tin; and therefore the mixture should be stirred with an iron rod, to make them fall into the tin at the bottom. Close the furnace, and let the whole remain in fusion from three to five minutes. Keep in readiness an iron or brass mortar, and an ingot-mould about six inches long; pour the tin into the ingot, and empty the culm and scoria into the mortar, scraping off what remains in and about the crucible with a sharp iron. As soon as cold, put them into another mortar, and pulverize them gently, so as to separate the scoria from the largest of the globules of tin. Select the larger globules, and pulverize the remainder a second time; then put this stuff, twice powdered, on a shovel, and passing it often through water, in the same manner as the lighter parts are washed from ores in vanning, and the smaller globules will remain on the shovel; and these, with the larger (both together being generally called *pillion-tin*), being added to, and weighed with the ingot, shew the produce in metal of the four or five ounces assayed. See Macquer's Chem. Dict.; and Pryce's Min. Corn. p. 269.

**TIN-Plates,** an article of manufacture very common among us, and vulgarly called *tin*. It is iron plated over with tin. The French call it *fer blanc*, white iron, as we sometimes do in England. It was once known under a distinct name, *latten*, under which article the process of manufacturing it is described.

The process used for this purpose near Caermarthen, in South Wales, which is described by Mr. Donovan, in his "Descriptive Excursions through South Wales in 1805," is as follows:

The iron-ore employed in this manufactory is the common kind of the country, intermixed with a large portion of the fine hæmatite from Ulverstone, in Lancashire, which gives a very fine metal. This too is smelted with charcoal instead of coke, to produce a metal of the greatest purity and extensibility, and closeness of texture, which qualities are particularly required in this manufacture. The reduced ore is smelted in the usual manner, and cast into pigs, which are then wrought by the hammer into long flat bars, that are afterwards cut into pieces of about ten inches in length. These are then wrought into plates by being heated red-hot, and passed through a flattening-mill, which consists of two large cylinders of steel, case-hardened and secured in a frame of iron. These are placed contiguous to each other, but with a certain interval of space, and revolve in a contrary direction, so that when one end of the bar is thrust in the space between the cylinders, the whole is drawn through and proportionably extended and flattened in the passage. The distance between the cylinders, which of course determines the thickness of the plate, is maintained and regulated by screws which can be altered at pleasure. When the bar is thus made into a plate of twice the thickness of the ordinary plates, it is heated red-hot, cut in two by a pair of shears, and one piece folded exactly over the other, and both re-passed repeatedly through the cylinders till the folded plate has extended to the same length and breadth as the plate was before cutting. It is then clipped round the edges, and the two plates torn asunder (which requires some little force) after which they are each finished by passing through a finer rolling-press, so as to take away every crease or inequality in the plate, and those that are too rough to pass through this finer press are thrown aside.

The plates are then steeped in a very weak acid liquor, and when taken out are scoured thoroughly with bran, so as

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to be quite bright and polished to enable the tin to adhere. The tin is melted in deep rectangular crucibles, and kept fluid by a moderate charcoal fire beneath. To prevent its calcination, a quantity of greafe prepared from linfeed-oil and fuet is constantly kept floating on the surface of the tin, and renewed as it evaporates off, which gives an exceedingly nauſeous ſtench. The plate is then taken up by one corner by a pair of pincers, and dipped vertically into the tin, and when withdrawn is found beautifully white and reſplendent with the coating of this metal that adheres to it. This dipping is repeated three times for what is called *ſingle tin-plate*, and ſix times for the *double plate*. The plates are then only cleaned and ſorted, and are fit for uſe.

We ſhall here add, with regard to the hiſtory of this manufacture, that in the year 1681, tin-plates were made in England by one Andrew Yarranton, who was ſent to Bohemia to learn the manner of making them. But the manufacture was diſcontinued by his employers, and afterwards ſo much diſregarded, as to be reckoned among the projects called bubbles of the year 1720; however, it was revived, and brought to ſuch perfection about the year 1740, that very little of it was imported from foreign parts; our own plates being of a finer gloſs, or coat, than that made beyond ſea, the latter being hammered, and ours being drawn under a rolling-mill. *And. Hiſt. Com. vol. ii. p. 175, 361.*

The two principal wholeſale houſes for this manufacture in London, are thoſe of Jones and Taylor in Tottenham-Court Road, and Howard and Co., in Old-ſtreet Road.

**TINA**, a name given by the old medical writers to a bath made of a ſtrong decoction of many carminative ingredients to be uſed in the colic.

**TINA**, in *Geography*. See **KNIN**.

**TINAGOB**, a town on the W. coaſt of the iſland of Samar. N. lat. 12° 5'. E. long. 124° 30'.

**TINALMO**, a town on the S. coaſt of the iſland of Luçon. N. lat. 13° 38'. E. long. 122° 42'.

**TINAMASAKI**, a town of Japan, on the S. coaſt of the iſland of Niphon. N. lat. 34° 12'. E. long. 136° 55'.

**TINAPA**, a town of Mexico, in the province of New Biſcay; 120 miles N.W. of Duranga.

**TINARA**, a town of Nubia, on the Nile; 200 miles S.S.W. of Syene.

**TINCA**, the *Tench*, in *Ichthyology*. See **CYPRINUS Tinca**, and **TENCH**.

**TINCA Marina**, the *ſea-tench*, a name given by ſome authors to the common *turdus*, called in Engliſh the *wraſſe*, and *phycis*.

**TINCAL**, is a name given to borax in the crude ſtate in which it is brought from India, and before it is refined. It conſiſts of ſmall cryſtals of a yellowiſh colour, and it has a greaſy or unctuous touch. See **BORAX**.

According to M. Cadet, it contains a larger quantity of the peculiar vitreſcible earth of borax than the refined ſalt commonly ſold does. See **BAURAC**.

**TINCAUSARIS**, in *Ancient Geography*, a place of Africa, in Cyrenaica, on the route from Carthage to Alexandria, between Boreum and Atticis. Anton. Itin.

**TINCHEBRAY**, in *Geography*, a town of France, in the department of the Orne; 10 miles N. of Domfront.

**TINCO**, a town of Spain, in the province of Aſturias; 20 miles N.W. of Oviedo.

**TINCONTIUM**, or **TINCONCIUM**, in *Ancient Geography*, a town of Lyonneſe Gaul, between Avarican and Decaida. Anton. Itin.

**TINCTOR**, **JOHN**, in *Biography*, born at Nivelles, in Brabant, and flouriſhed about the year 1474. He was a great

muſician, long in the ſervice of Ferdinand of Aragon, king of Naples and Sicily, who reigned from 1458 to 1504, and ſtyles himſelf his arch-deacon, chaplain, and cantor. Beſides ſeveral muſical traacts by this early writer on counterpoint, he was author of the firſt muſical dictionary. All written muſic in counterpoint during the fifteenth century was compoſed for voices, at leaſt we have never ſeen any other; and being intended for the church, was ſet to Latin words: ſo that the firſt terms uſed in the art, were likewiſe in that language; and theſe were ſo numerous in Tinctor's time, that he collected them, under the title of "Terminorum Muſicæ Diffinitorium," and printed them at Naples. This was doubtleſs not only the firſt muſical dictionary that was ever compiled, but the firſt book that was printed on the ſubject of muſic in general. The work is ſo ſcarce, that we have never been able to find it, except in his majeſty's ineſtimable library. In this "Diffinitorium," we firſt met with the precise definition of the four principal parts in vocal counterpoint: *cantus, altus, tenor, and baſe*; which ſee under their ſeveral heads.

Tinctor, in one of his traacts, gives to the Engliſh the invention of counterpoint. See **DUNSTABLE**.

Walther ſeems never to have heard of Tinctor's "Diffinitorium;" but he gives the title of his three traacts: "De Arte Contrapuncti;" "De Tonis;" and "De Origine Muſicæ;" from Geſner's *Bibl. Univ.*

**TINCTORUM RUBIA**. See **MADDER**.

**TINCTURE**, **TINCTURA**, in *Pharmacy and Chemistry*, a ſeparation of the finer and more volatile parts of a mixed body, made by means of a proper menſtrum diſſolving the ſame.

**TINCTURE** is more particularly uſed for an extract of part of the ſubſtance of a body, eſpecially its flavour and colour, which are hereby communicated to the menſtrum.

**TINCTURES**, in the *Materia Medica*, are ſpirituous ſolutions of ſuch of the proximate principles of vegetables and animals, as are ſoluble in pure alcohol or in proof-ſpirit; and they are ſaid to have been invented about the end of the thirteenth century, by a profeſſor of medicine at Montpellier, called Arnold de Villa Nova. From vegetable matter ſubmitted to its action, alcohol takes up ſugar, reſin, extractive, tannin, cinchonin, camphor, volatile oils, ſeveral acids, and the narcotic principle; proof-ſpirit alſo takes up the whole of theſe partially, and is beſides the proper menſtrum for gum-reſins; ſo that alcohol, either in a concentrated or diluted form, is capable of ſeparating the greater part of the active principles of vegetables from the ligneous inert fibres. The tinctures obtained from animal ſubſtances are very few in number, and the principles taken up by the ſpirit are analogous to thoſe enumerated above, belonging to the vegetable kingdom.

Pure alcohol is required in very few inſtances only for the formation of tinctures, proof-ſpirit being adequate for almoſt every purpoſe. The dilution of the ſpirit, however, muſt be varied according to the known principles of the ſubſtances to be ſubmitted to its action; when reſin predominates, it muſt neceſſarily be more concentrated; when gum-reſin or extractive is the moſt abundant conſtituent, proof-ſpirit then muſt be employed. In conſequence of the great affinity of water for alcohol, the addition of it to alcoholic tinctures ſeparates the reſin, camphor, and volatile oils they contain; but water is generally miſcible with tinctures made with proof-ſpirit, without producing any decomposition. Tinctures are not liable to ſuffer ſpontaneous decomposition, as is the caſe with infuſions and decoctions; and, independently of the loſs which takes place from the evaporation of the ſpirit and the volatile oils, if the bottles containing tinctures be cloſely corked, they may

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be kept for an indefinite length of time, and their virtues remain unimpaired.

Tinctures are prepared by macerating the ingredients in the spirit in a temperature not exceeding 80°, at which degree, by allowing the menstruum to remain on the ingredients for a sufficient length of time, all the principles that can prove useful in the tincture are extracted, and the solvent saturated. The ingredients must be dried and reduced to a coarse powder, and the maceration made in close vessels, and assisted by frequent agitation. When completely made, tinctures should not be allowed to remain upon the ingredients, but be filtered through bibulous paper, and kept in this state in well-corked bottles.

The chief use of this class of preparations is to cause infusions and decoctions to which they are added, to fit lighter upon the stomach, or to unite with them some active principle, which the water is incapable of extracting. Thomson's London Dispensatory.

A great variety of tinctures may be given to common water, and many remarkable things occur in their changes on the addition of common menstrooms. Take a large spoonful of the syrup of pomegranate-flowers, mix it with five spoonfuls of water; the mixture will be of a very lively and brilliant red: for a violet colour, take the same quantity of syrup of violets and the same of water. When these tinctures are thus prepared, have at hand a phial, in which is a small portion of oil of tartar, which will only look like water remaining after the washing of the phial. Pour the red or the violet tincture into this phial, and it immediately becomes a fine grass-green. Dissolve the quantity of a walnut of crude sal ammoniac in a glass of water, pour all out except three or four drops at the bottom, and pour into this glass the fine red liquor, and it immediately becomes black as ink. In order to change the purple liquor red, only have a small quantity of spirit of vitriol in the bottom of a phial, and pour into this the violet water; it immediately on this becomes of a florid red.

Steep Brazil wood in common water, or in white wine, twenty hours; the liquor will then look of the colour of red wine: pour this into a glass washed with vinegar, and it becomes of a fine yellow, like saff. If this experiment be made with white wine, the wood and the vinegar make so little alteration in it, that it may be drank afterwards, and the whole process seems a way of turning red port into saff. Into this liquor, when yellow, put a few drops of a tincture of benjamin made in spirit of wine, and it immediately loses its yellow colour and becomes white. Beat some galls to fine powder, and rub the powder on a towel; then put into a basin of water, in which any person is going to wash their hands and face, a small piece of common green vitriol, or copperas: after the person has washed, let them have this towel to wipe on, and the hands and face will be as black as if washed with the common writing-ink; the copperas in the water and the galls on the towel making real ink where they mix. This does no lasting injury to the skin, but will come off again upon washing with soap. Phil. Trans. N. 238, p. 88.

We shall here enumerate and describe the principal tinctures that occur in the materia medica.

*TINCTURE of Acetate of Iron* is prepared, according to the Dub. Phar. by adding together two ounces of acetate of kali and one ounce of sulphate of iron in a stone-ware mortar, till they unite in a soft mass, and when dried by a moderate heat, triturating it with two pints of rectified spirit of wine; and then digesting it for seven days in a phial, closely corked, and frequently agitated, and then pouring the clear tincture from the fæces.

*TINCTURE of Acetate of Iron with Alcohol*, is prepared by

rubbing together sulphate of iron and acetate of alkali, of each an ounce, and proceeding as in the former article, triturating with two pints of alcohol; and digesting for twenty-four hours. These tinctures have a peculiar odour, a reddish-brown colour, and a warm styptic taste; and possess the same medical properties as the other preparations of iron. The dose of either may be from ℞ to ℥j, given in water or any other suitable vehicle.

*TINCTURE of Acetate of Zinc* of the Dub. Ph., is obtained by rubbing sulphate of zinc and acetate of kali, of each an ounce, and adding one pint of rectified spirit of wine, and then macerating for a week with occasional agitation, and filtering through paper. This tincture is astringent, but requires to be diluted with water, before it is used either as a collyrium or an injection. It may be beneficially employed as an internal remedy in dyspepsia and other debilities of the stomach.

*TINCTURE of Aloes* of the Lond. Ph., is prepared by macerating of extract of spiked aloes powdered, half an ounce; of extract of liquorice, an ounce and a half; of water, a pint; and of rectified spirit, four fluid-ounces, in a sand-bath until the extracts are dissolved, and then straining.

The *tincture of aloes* of the Dub. Ph. is obtained by digesting for seven days, half an ounce of focotorine aloes powdered, an ounce and a half of extract of liquorice dissolved in eight ounces of boiling water, and eight fluid-ounces of proof-spirit, and then straining.

The *tincture of focotorine aloes* of the Edinb. Ph. is formed by digesting for seven days, with a gentle heat, in a close vessel, often shaken, half an ounce of focotorine aloes in powder, an ounce and a half of extract of liquorice, four ounces of alcohol, and a pound of water; and pouring off the clear tincture. Its dose is from ℥ʒss to ℥ʒjss.

*Tincture, ethereal, of aloes* of the Edinb. Ph., is prepared by digesting an ounce and a half of myrrh with a pound of sulphuric ether with alcohol, for four days, in a closed bottle, and then adding one ounce of English saffron cut, and one and a half of focotorine aloes in powder; digesting again for four days, and pouring off the tincture. This is a warm stomachic purgative, and is given with advantage in dyspeptic affections, jaundice, gout, chlorosis, and other cases in which aloetics are proper; in doses of ℥ʒj or ℥ʒij as a stomachic, and in larger doses as a brisk purge.

*Tincture, compound, of aloes* of the Lond. and Dub. Ph., is prepared by macerating for fourteen days (seven days Dub.), of extract of spiked aloes powdered, and saffron, of each three ounces, in two pints of tincture of myrrh; and straining.

*Tincture of aloes and myrrh* of the Edinb. Ph., is prepared by mixing a pound and a half of alcohol with half a pound of water, and then adding two ounces of myrrh in powder; digesting for four days; and, lastly, adding of focotorine aloes in powder an ounce and a half, and an ounce of English saffron cut; digesting again for three days, and pouring off the clear tincture. This tincture may be administered in the same cases and doses as the former; and it is occasionally used as a local stimulant to foul ulcers.

The *tincture of aloes*, formerly called *tinctura sacra*, and *hiera picra*, was ordered to be made by digesting five ounces of the powder, called *hiera picra*, or a powder formed of eight parts of aloes and two of canella alba, in five pints of mountain wine; or an ounce of aloes, with one drachm of the lesser cardamom seeds, and the same quantity of ginger, in two pounds of the same wine. Lewis.

Dr. Buehan directs this tincture to be made by infusing an ounce of focotorine aloes in powder, and two drachms of Virginia snake-root, and as much ginger, in a pint of mountain

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mountain wine and half a pint of brandy, for a week, frequently shaking the bottle, and straining off the tincture. This, he says, is a safe and useful purge for persons of a languid and phlegmatic habit; but it is thought to have better effect when taken in small doses as a laxative. The dose, as a purge, is from one to two ounces.

*TINCTURE of Ambergris.* See AMBERGRIS.

*TINCTURE of Ammoniated Iron.* See IRON.

*TINCTURE of Angustura Bark.* See ANGUSTURA.

*TINCTURE of Antimony* used to be thus made: Take salt of tartar, a pound; antimony, half a pound; rectified spirit of wine, a quart; reduce the antimony to powder, and mix it with the salt by fusion over a strong fire. When it is cold powder it, and pour on the spirit of wine; digest them together in a sand-heat, and then filter off the clear tincture for use. The salt of tartar yields a tincture as well as antimony. It is a diaphoretic and attenuant. See ANTIMONY.

This tincture, on an empty stomach, is said to have sometimes proved emetic.

*TINCTURA Antiphthifica.* See TINCTURA Saturnina.

*TINCTURE, Aromatic,* may be prepared by infusing two ounces of Jamaica pepper in two pints of brandy, without heat, for a few days, and then straining off the tincture. This will answer all the intentions of the more costly preparations of this kind.

*TINCTURE of Assafœtida.* See ASSAFŒTIDA.

*TINCTURA Aurantii, Tincture of Orange-peel,* is obtained in the Lond. and Dub. Ph., by macerating three ounces of fresh orange-peel in two pints of proof-spirit for fourteen days (three days Dub.), and filtering. This is an useful adjunct to infusions and decoctions in dyspepsia, communicating to them an agreeable flavour, and not decomposable by water.

*TINCTURE of Bark.* See ANGUSTURA and *TINCTURE of Cinchona.*

*TINCTURE of Benzoin, Compound,* of the Lond. and Dub. Ph., is prepared by macerating for fourteen days (seven days Dub.), three ounces of benzoin, two ounces of storax balsam strained, one ounce of balsam of Tolu, and half an ounce of spiked aloes, in two pints of rectified spirit, and filtering.

The *compound tincture of benzoin* of the Edinb. Ph., or *Traumatic balsam,* is obtained by digesting for seven days, three ounces of benzoin in powder, two ounces of balsam of Peru, half an ounce of hepatic aloes in powder, in two pints of alcohol, and filtering through paper. This tincture is a stimulating expectorant, and sometimes prescribed in chronic catarrh and old asthmatic cases; but chiefly used as an external application to wounds and languid ulcers. Its dose is from fʒʒs to fʒij, or more. See BENZOIN.

*TINCTURE of Calumba* of the Lond. Ph., is had by macerating for fourteen days of calumba (or Columbo) root sliced, two ounces and a half, in two pints of proof-spirit, and filtering.

The Edinb. *tincture of calumba* is obtained by digesting for seven days, two ounces of calumba root in powder, in two pounds of proof-spirit, and filtering through paper. This is an useful addition to stomaclial infusions and decoctions. See COLUMBO.

*TINCTURE of Camphor, Compound,* is ordered by the Lond. Ph. to be prepared by macerating for fourteen days, of camphor two scruples, of hard opium powdered and acid of benzoin, of each one drachm, in two pints of proof-spirit, and filtering.

The *camphorated tincture of opium,* or "paregoric elixir," is obtained by digesting for ten days, of hard purified opium in powder, and benzoic acid, of each a drachm, of camphor

two scruples, of essential oil of aniseed a drachm, in two pints of proof-spirit, and filtering. This is an useful anodyne in chronic asthma, whooping-cough, and catarrh after the inflammatory symptoms have abated, and contributes to allay the frequent cough. The dose is from fʒj to fʒij occasionally, using after it the inhaler, and fʒij in cases where quiet, rather than sleep, is required. See CAMPHOR.

*TINCTURE of Capsicum* of the Lond. Ph., is obtained by macerating for fourteen days, an ounce of capsicum berries in two pints of proof-spirit, and filtering. The dose in tympanitis, cyananche maligna, the low stage of typhus, and such cases, is from fʒss to fʒj; and a mixture of fʒvj with half a pint of water will answer all the purposes of the capsicum gargle. See CAPSICUM.

*TINCTURE of Cardamoms* of the Lond. and Dub. Ph., is prepared by macerating for fourteen days (seven days Dub.) three ounces of cardamom seeds husked and bruised, in two pints of proof-spirit, and filtering.

The *tincture of cardamoms,* or "tinctura amoni repentis," of the Edinb. Ph. is had by digesting for seven days, four ounces of lesser cardamom seeds bruised, in two pounds and a half of proof-spirit, and filtering through paper.

The *compound tincture of cardamoms* of the Lond. and Dub. Ph. is prepared by macerating for fourteen days, cardamom seeds (husked Dub.), caraway seeds and cochineal, of each, in powder, two drachms, cinnamon bark bruised half an ounce, stoned raisins four ounces, in two pints of proof-spirit, and filtering. These are agreeable additions to stomaclial infusions.

*TINCTURE of Cascarilla.* See CASCARILLA.

*TINCTURE of Cassia.* See CASSIA.

*TINCTURE of Castor* of the Lond. and Dub. Ph., is formed by macerating for seven days, of castor powdered two ounces, in two pints of rectified spirit (proof-spirit Dub.) and filtering. The Edinb. Ph. directs an ounce and a half of Russian castor powdered to be macerated for seven days in one pound of alcohol, and then filtered. The dose is from ℥xx to fʒij. See CASTOR.

The *compound tincture of castor* of the Edinb. Ph. is obtained by digesting for seven days, one ounce of Russian castor powdered, half an ounce of assafœtida, in a pound of ammoniated alcohol, and filtering through paper. This is advantageously given in hysteria, cramp of the stomach, and flatulent colic, to the extent of fʒij for a dose.

*TINCTURE of Catechu* of the Lond. and Dub. Ph., is prepared by macerating for fourteen (seven Dub.) days, three ounces of extract of catechu, and two ounces of cinnamon bark bruised, in two pints of proof-spirit, and filtering.

The *tincture of catechu,* formerly *Japonic tincture* of Edinb. Ph., is prepared by digesting for seven days, three ounces of extract of catechu in powder, two ounces of cinnamon bark bruised, in two pounds and a half of proof-spirit, and filtering through paper. This tincture is a solution of tannin, extractive matter, and the oil of cinnamon. The dose, in cases where astringents are required, is from fʒj to fʒij, taken in water or wine, or cretaceous mixture.

*TINCTURE of Cinchona* of the Lond. Ph., is obtained by macerating for fourteen days, seven ounces of lance-leaved cinchona bark in powder, in two pints of proof-spirit, and filtering.

The *tincture of cinchona* of the Edinb. and Dub. Ph. is had by digesting for seven days, four ounces of cinchona bark in powder, in two pounds and a half (two pints Dub.) of proof-spirit, and filtering through paper. The dose is from fʒj to fʒiv.

For the *compound tincture of cinchona,* see SNAKE-ROOT.

This is the same as the celebrated tincture of Huxham, who

## TINCTURE.

who gave it in intermittents and low nervous fevers, in diluted wine or other proper vehicle, with 10 or 15 drops of elixir of vitriol (aromatic sulphuric acid, Edinb.) in doses of from ℥ʒj to ℥ʒiij, or more in intermittents. See CINCHONA.

**TINCTURE of Cinnamon** of the Lond. and Dub. Ph., is obtained by macerating for fourteen days (seven days Dub.) three ounces of cinnamon bark bruised (three ounces and a half Dub.) in two pints of proof-spirit, and filtering. The dose, as a fit adjunct to the chalk mixture and altringent infusions, is from ℥ʒj to ℥ʒiij.

The *compound tincture of cinnamon* of the Lond. and Dub. Ph., is prepared by macerating for fourteen days (seven days Dub.) six drachms of cinnamon bark bruised, three drachms of cardamom seeds bruised, long-pepper powdered and ginger, of each two drachms, in two pints of proof-spirit, and filtering.

The *compound tincture of cinnamon* of Edinb. is formed by digesting for seven days, cinnamon bark bruised, lesser cardamom seeds bruised, of each one ounce, long-pepper in powder two drachms, in two pounds and a half of proof-spirit, and filtering through paper. This is beneficially used in flatulencies, atonic gout, languors, and debility, in doses of ℥ʒj or ℥ʒiij properly diluted.

**TINCTURA Croci**, or *Tincture of Saffron* of the Edinb. and Dub. Ph., is prepared by digesting for seven days, one ounce of English saffron cut in shreds in fifteen ounces (a pint Dub.) of proof-spirit, and filtering through paper. See CROCUS and SAFERON.

**TINCTURE of Fox-glove** (*Digitalis*) of the Lond. Ph., is obtained by macerating of fox-glove leaves dried (rejecting the large ones) and reduced to a coarse powder, two ounces, in a pint of proof-spirit, and filtering. The Dub. Ph. directs two ounces of fox-glove leaves (the larger ones rejected) dried and coarsely powdered, in a pint of proof-spirit, and then to filter.

The *tincture of fox-glove* of Edinb. Ph. is had by digesting for seven days, one ounce of fox-glove leaves dried, in eight ounces of proof-spirit, and filtering through paper. The dose of this tincture should be ℥ at first, and gradually increased.

**TINCTURE of Galbanum** of the Dub. Ph., is formed by digesting for seven days, two ounces of galbanum cut into small pieces, in two pints of proof-spirit, and then filtering. Used as tincture of aflaxetida, but less nauseous and less powerful.

**TINCTURE of Galls** (Dub.) is prepared by macerating for seven days, four ounces of galls in powder, in two pints of proof-spirit, and then filtering. The dose, as an altringent, is from ℥ʒj to ℥ʒiij.

**TINCTURE of Gentian, Compound**, (Lond. and Dub.) is obtained by macerating for fourteen days (seven days Dub.) two ounces of gentian root cut, one ounce of orange-peel dried, half an ounce of cardamom seeds bruised, in two pints of proof-spirit, and filtering.

The *compound tincture of gentian*, commonly called "stomachic tincture," of Edinb. Ph., is prepared by digesting for seven days, two ounces of gentian root sliced and bruised, one ounce of orange-peel dried and bruised, half an ounce of canella alba bruised, half a drachm of cochineal in powder, in two pints and a half of proof-spirit, and filtering through paper. This is an elegant stomachic bitter and cordial, but in dyspepsia the infusion is preferable. See GENTIAN.

**TINCTURE of Gold**. See *AURUM Potabile*, and *Chemical History of GOLD*.

**TINCTURE of Guaiac** of the Lond. and Dub. Ph., is prepared by macerating for fourteen days (seven days Dub.)

half a pound of guaiac powdered (four ounces Dub.), in two pints of proof-spirit, and filtering.

The *tincture of guaiac* of the Edinb. Ph., is formed by digesting for seven days, one pound of guaiac powdered, in two pounds and a half of alcohol, and filtering through paper. Administered in the form of a draught, it must be triturated with yolk of egg or mucilage, that it may combine with water. The dose is from ℥ʒj to ℥ʒiij, in any convenient vehicle.

The *ammoniated tincture of guaiacum* of the Lond. and Dub. Ph., is obtained by macerating for fourteen days (seven days Edinb. and Dub.), four ounces of guaiac in powder, in two pints of compound spirit of ammonia, and filtering. The dose is from ℥ʒj to ℥ʒiij, triturated with any mucous or viscid matter. See GUAIAECUM.

**TINCTURE of Black Hellebore** of the Lond. Ph., is obtained by macerating for fourteen days, four ounces of the root of black hellebore sliced, in two pints of proof-spirit, and filtering.

The *tincture of black hellebore* of the Edinb. and Dub. Ph., is prepared by digesting for seven days, four ounces of black hellebore root bruised (powdered Dub.), half a drachm (two scruples Dub.) of cochineal in powder, in two pounds and a half (two pints Dub.) of proof-spirit, and filtering through paper. This tincture was regarded by Dr. Mead as a powerful emmenagogue, and is still ordered in uterine obstructions, and in some cutaneous affections. The dose is from ℥xxx to ℥ʒj, in any appropriate vehicle. See HELLEBORE.

**TINCTURE of White Hellebore**. See *TINCTURA Veratri Albi*.

**TINCTURE of Henbane** of the Lond. Ph., is formed by macerating for fourteen days, four ounces of the dried leaves of henbane in two pints of proof-spirit, and filtering. The Dub. Ph. directs to digest for seven days, two ounces and a quarter of dried leaves of black henbane, in coarse powder, in a pint of proof-spirit, and then straining.

The *tincture of black henbane* of the Edinb. Ph. is had by digesting for seven days, one ounce of the dried leaves of black henbane in eight ounces of proof-spirit, and filtering through paper. In a dose of ℥ʒj, it seldom fails of procuring sleep and quiet, and does not affect the head or produce costiveness. In cases of diarrhoea, a few drops of tincture of opium should be added to counteract its tendency to pass off by the bowels.

**TINCTURE of Hops** of the Lond. Ph., is formed by macerating for fourteen days, five ounces of hops in two pints of proof-spirit, and straining. This has been recommended as a substitute for tincture of opium in gout and rheumatism. The dose is from ℥ʒs to ℥ʒiij, or more. See HOPS.

**TINCTURE of Jalap** of the Lond. Ph., is made by macerating for fourteen days, two ounces of jalap root powdered, in two pints of proof-spirit, and filtering. The Dub. Ph. orders five ounces of jalap root in coarse powder, to be digested for seven days in two pints of proof-spirit, and then filtered.

The *tincture of jalap* of the Edinb. Ph. is formed by digesting for seven days, three ounces of jalap root in powder, in fifteen ounces of proof-spirit, and then filtering. See JALAP.

**TINCTURE, Japonic**. See *TINCTURE of Catechu*.

**TINCTURE of Kino** is obtained by macerating for fourteen days, three ounces of kino in powder, in two pints of proof-spirit, and filtering through paper. In the Edinb. and Dub. Ph. two ounces of kino (three ounces Dub.) are digested for two days in a pint and a half of proof-spirit, and filtered through paper. The dose is from ℥ʒj to ℥ʒiij.

**TINCTURE of Lacca**. See LAC.

## TINCTURE.

*TINCTURA Lyttae*, or *Tincture of Blistering Fly*. See *LYTTÆ*.

*TINCTURA Martis cum Spiritu Salis*, a medicine thus prepared: Take filings of iron, half a pound; Glauber's spirit of sea-salt, three pounds; digest all together without heat, as long as the spirit will work upon the filings; then, after the fæces have subsided, pour off the clear liquor, evaporating it to one pound, and adding of rectified spirit of wine three pints.

Some combine the acid and inflammable spirits first, and digest three ounces of iron-filings in a quart of the dulcified compound. A few drops of this tincture are a sufficient dose.

This tincture is good in all the cases in which the sal martis is so.

*TINCTURE of Martial Flowers*. See *IRON*.

*TINCTURE of Metals*, called *Lily of Paracelsus*, may be prepared by melting together in a crucible two parts of martial regulus of antimony, one part of fine tin, and one part of pure copper. The alloy thus compounded is to be powdered, when cold, and mixed with thrice its weight of purified nitre. The mixture is to be thrown, at different times, into a red-hot crucible, where it detonates, and is exposed to a violent fire, till the metals be perfectly reduced to calces. The matter is to be taken from the crucible, while red-hot, and immediately thrown into a heated iron mortar, where it is quickly powdered. The powder, while hot, is to be put into a matras, and upon it some rectified spirit of wine is to be poured to a height equal to the breadth of four fingers. The digestion is continued during some days, or till the spirit of wine has acquired a very deep yellowish-red colour. The spirit is to be decanted and kept in a bottle.

This tincture, although no part of the metals, reduced by calcination almost to the state of pure earths, can be dissolved by the spirit of urine, has a spirituous, saponaceous, acrid, and alkaline character, and has been successfully used, when the fibres and vessels require to be excited and animated, as in apoplexies, palsies, and dropries. It is also capable of accelerating the motion of the blood, and of increasing certain secretions and excretions, particularly sweat and urine. The dose is from six or twelve drops to forty, or even more, and must be administered in some proper cordial. *Macquer's Dict. Chem.*

*TINCTURE of Muriate of Iron*. See *IRON*.

*TINCTURE of Musk of the Dub. Ph.*, is obtained by digesting for seven days, two drachms of musk in powder, in a pint of rectified spirit, and then straining.

Tincture of musk is directed, in the *Edinb. Ph.* of 1783, to be made by dissolving two drachms of musk, in a pound of rectified spirit.

*TINCTURE of Myrrh of the Lond. Ph.*, is prepared by macerating for fourteen days, three ounces of myrrh bruised, in twenty-two fluid-ounces of rectified spirit, and a pint and a half of water, and filtering. The *Edinb. Ph.* directs three ounces of myrrh in powder to be digested for seven days, in twenty ounces of alcohol and ten ounces of water, and filtered through paper. The *Dub. Ph.* orders three ounces of myrrh bruised to be digested for seven days, in a pint and a half of proof-spirit and half a pint of rectified spirit, and then strained. This tincture is tonic and deobstruent; it is used now generally in gargles, combined with infusions of roses and acids; or applied to foul ulcers and exfoliating bones, or diluted with water, as a wash for the mouth when the gums are spongy. The dose is from  $\text{ʒ}i$ s to  $\text{ʒ}j$ .

*TINCTURE of Opium of the Lond. Ph.*, is formed by macerating for fourteen days, two ounces and a half of

hard opium powdered, in two pints of proof-spirit, and straining.

The *tincture of opium of Edinb. Ph.* or *Thebaic tincture*, or *liquid laudanum*, is obtained by macerating for seven days, two ounces of opium in two pounds of proof-spirit, and filtering through paper.

*Tincture of opium*, or *Thebaic tincture of Dub. Ph.* is prepared by digesting for seven days, ten drachms of purified hard opium in coarse powder, in a pint of proof-spirit, then straining. The usual dose is from  $\text{ʒ}x$  to  $\text{ʒ}lxx$ . In colica pictonum,  $\text{ʒ}j$ , given before purges, facilitates their action, and renders the relief more speedy; and in tetanus,  $\text{ʒ}v$ s have been advantageously given in divided doses, in twenty-six hours. The tincture externally applied allays local pain, and assists in relaxing the spasm in lock-jaw and similar affections.

The *ammoniated tincture of opium of the Edinb. Ph.* is formed by digesting for seven days, in a close phial, three drachms of benzoic acid, and the same quantity of English saffron, cut in shreds, two drachms of opium, half a drachm of volatile oil of aniseed, in sixteen ounces of ammoniated alcohol, and filtering through paper. This tincture is used in hooping-coughs and spasmodic asthma. Each  $\text{ʒ}j$  contains gr. j of opium. See *OPIMUM*.

*TINCTURE of Quassia of the Dub. Ph.*, is obtained by digesting for seven days, an ounce of chips of quassia wood in two pints of proof-spirit.

*TINCTURE of Rhubarb*. See *RHUBARB*.

*TINCTURE of Saffron*. See *TINCTURA Croci*.

*TINCTURE of Sena*. See *SENA*.

*TINCTURE of Salt of Tartar*, is made by pouring some rectified spirits of wine, to a height equal to the breadth of three or four fingers, into a heated matras, that contains some hot salt of tartar, which has been previously fused in a crucible and powdered. The matras is to be closed, and the digestion continued for several days with a gentle heat, or till the spirit of wine has acquired a fine reddish-yellow colour.

This is essentially the same as tincture of metals, their medicinal qualities being the same.

*TINCTURA Saturnina*, the lead tincture, a name given in the late London Dispensatory to the tincture before called *tinctura antiphtisica*, because it was used to check the immoderate sweats in hectic complaints.

It is made of sugar of lead and green vitriol, of each two ounces, and of rectified spirit a quart. The salts are separately to be reduced to powder, and then put into the spirit, then the whole is to stand some days without heat to extract the tincture, and afterwards filtered through paper.

Many persons have found great perplexity in making this tincture, it having at first begun to shew a good colour, but afterwards lost it: this accident is owing to the heat usually employed in making the tincture.

This tincture is a powerful styptic, and is often used with good success in hectic fevers, spitting of blood, heat of the kidneys, simple gonorrhœas, fluor albus, and tabes dorsalis.

It was first recommended by Etmuller; who, from its effect, gave it the name of *tinctura antiphtisica*, which our College of Physicians changed to that of *tinctura saturnina*. The *Edinb. Ph.* directed it to be made of three ounces of the sugar and two of the vitriol, to a quart of spirit, and in the best of the foreign ones. Mr. Boyle recommends it, and our most eminent physicians formerly used it, notwithstanding that some authors consider it as a dangerous medicine, on account of its principal ingredient, the *saccharum saturni*, which some call a slow poison. Whether it be fo

or not when given in substance, it is certain that there is a great difference between a corrosive salt so given, and a tincture made of the same, in spirit of wine, and given in small doses, as Dr. Mead observes; who adds, that in slow hectic fevers attended with a looseness, profuse sweats, and a colliquation of the humours, he reckons two or three drachms, given at different times, in cooling liquors, every twenty-four hours, to be a convenient dose. But the usual dose was from fifteen to thirty drops in Bristol water, or some temperate or cool julep.

Concerning the danger of saturnine preparations, when applied to the purposes of internal medicine, see sir George Baker's Farther Observations on the Poison of Lead, in Med. Transf. vol. ii. p. 446, &c. See also COLICA DAMNIFICUM, LEAD, SACCHARUM Saturni, and VINEGAR of Lead.

TINCTURE of Snake-root. See SNAKE-ROOT.

TINCTURE of Soot. See SOOT.

TINCTURE of Squills. See SQUILLS.

TINCTURE of Spanish Flies, or *Tinctura Cantharides*. See TINCTURA Lyttæ.

TINCTURA Styptica, a form of medicine made with very little trouble and apparatus, and serving to supply the place of that elaborate preparation the tincture of Helvetius: it is prescribed in the late Lond. Ph., and is to be made by mixing a drachm of calcined green vitriol with a quart of French brandy tinctured by the cask: this is to be shook together, that the brandy may turn black, and then strained off for use.

TINCTURE of Sulphur. See SULPHUR.

TINCTURA Thebaica. See TINCTURE of Opium.

TINCTURE of the Balsam of Tolu of the Edinb. Ph., is made by digesting an ounce and a half of the balsam in a pound of alcohol in a gentle heat, till the balsam is dissolved, and filtering through paper.

This tincture possesses all the virtues of the balsam; and in coughs, and other complaints of the breast, a tea-spoonful or two of it may be taken in a bit of loaf-sugar.

But it is chiefly used for making the syrup. An ounce of the tincture, properly mixed with two pounds of simple syrup, will make what is commonly called the balsamic syrup. See SYRUP.

TINCTURE of Valerian of the Lond. and Dub. Ph., is prepared by macerating for fourteen days (seven days Dub.) four ounces of valerian root in powder, in two pints of proof-spirit.

The ammoniated tincture of valerian of the Lond. Ph. is obtained by macerating for fourteen days, four ounces of valerian root in two pints of aromatic spirit of ammonia, and filtering. The Dub. Ph. directs two ounces of valerian root in powder to be digested for seven days in a pint of spirit of ammonia. It is beneficially employed in hysteria and other nervous affections, in doses of ℥ʒi, or ℥ʒij, given in milk, or some other bland fluid.

TINCTURA Veratri Albi, Tincture of White Hellebore, of the Edinb. Ph., is made by digesting for seven days, eight ounces of white hellebore-root bruised, in a pound and a half of proof-spirit, and filtering through paper. This tincture is employed to excite vomiting in maniacal and apoplectic cases, and as an alterative in cutaneous eruptions. It is given in doses of ℥v to ℥x; but its effects are sometimes very violent. Thomson's Dispensatory.

TINCTURA Zingiberis, or Tincture of Ginger, of the Lond. and Dub. Ph., is formed by macerating for fourteen days (seven days Dub.) two ounces of ginger-root sliced, in two pints of proof-spirit, and filtering. This is useful as a stimulant and carminative, in atonic gout when it attacks

the stomach, in flatulent colic, and as a corrector of griping purgatives.

TINCTURE is also applied by the *Heralds* to the colours used in escutcheons, or coats of arms; under which, with them, are likewise included the two metals, or and *argent*, because often represented by yellow and white. See COLOUR.

TINCTURE comprehends *colours* and *furs*.

The writers on heraldry have had great disputes, which of these colours or tinctures are the most honourable. All agree in giving the pre-eminence to the metals gold and silver, that is, to the yellow and white colours: as to the others, some esteem them more noble as they approach more to light, that is, to whiteness. Upton, on this account, ranges them thus: azure or blue, gules or red, purple or purple, vert or green, sable or black: others wholly dissent from this, and prefer those colours most which can be seen at the greatest distance; with these, sable or black is the most honourable or first colour; and they allege the imperial black eagle, placed in a white field, as an instance of this. Leigh prefers the red to the blue, as the red has some alliance to gold, and the blue to silver; the sable is generally preferred to green and purple, by those who give the red and blue the first places: it is in this esteem on account of its strong appearance; and green is preferred to purple, because the latter is but of very late use in heraldry, and is called a new colour.

All the precedence given to tinctures must however be considered with this special proviso, that there is no particular reason for bearing them otherwise in the arms of kingdoms and families. In all coats of arms there should be two colours or tinctures; and it is the general rule that the field should be of a nobler colour than the figures placed upon it: thus in the arms of Scotland the field is yellow, and the lion placed upon it red; and if the field consists of two different colours parted by fess or by pale, then the noblest colour must always be in the best place, as on the upper part, or on the right hand of the shield; but all these rules are to be understood with this limitation, that there are no other special reasons in the family for the contrary. Nesbit's Heraldry, p. 19.

The two metals, or and argent, and the four colours, black, red, blue, and green, (see COLOUR,) are the several tinctures, says Edmondson, of which the fields and all charges of arms ought in strictness to be made; excepting, however, such charges as are to be borne in their own proper or natural colour; which bearings, not having in blazon any particular technical or fixed terms, are all comprehended under the word *proper*. As to the tinctures *purpure*, *tauriny*, and *sanguine*, these, being mixtures, are now seldom, if ever, used, either for fields or charges, though they are ranked among those, which, as some whimsical heralds say, have mystical significations, and represent the *moral*, *political*, and *military* virtues of those who originally bore their arms so coloured or tinctured. Some heralds, says the above-named writer, have blazoned the armorial colours in different terms, according to the rank and dignity of the person whose arms they are describing. Accordingly, the arms of gentlemen, esquires, knights, and baronets, are to be blazoned by tinctures; those of nobles by precious stones; and those of sovereign princes, kings, and emperors, by planets: but this mode of blazoning would, he thinks, introduce into the science of heraldry great absurdity and confusion, and render blazons in some cases very ridiculous.

TINCULEN, or TINZULEN, in *Geography*, a town of Africa, in the country of Darah; 120 miles S.W. of Taflet.

TINDAL,

**TINDAL, MATTHEW, LL.D.** in *Biography*, a reputed deist, was the son of a clergyman, and born at Beer-Ferres, in Devonshire, about the year 1657. From Lincoln college, Oxford, into which he was admitted in 1672, he was removed to Exeter college; and having graduated B.A., he was elected fellow of All-Souls college, and became LL.D. in 1685. About this time, the reign of James II., he was beset by some of the popish emissaries, who were then active and industrious in making profelytes, and converted to popery; but, upon farther examination, he returned to the church of England in 1687. To the revolution he was ardently attached; and having been admitted an advocate, he often sat as judge in the court of delegates, and had a pension from the crown of 200*l. per annum*. Tindal was both a political and theological writer, and under the latter description he published "A Letter to the Clergy of both Universities," on the subject of the Trinity and the Athanasian creed, with a view to some alterations in the Liturgy, which were subjects of discussion. But the treatise that attracted principal notice appeared in 1706, and was entitled "The Rights of the Christian Church asserted against the Romish and all other Priests who claim an independent Power over it; with a Preface, concerning the Government of the Church of England, as by Law established." This publication roused the animadversions of the high-church clergy, and the vendors of it were legally indicted. The favourable notice taken of this work by Le Clerc, in his "Bibliothèque Choïsée," gave great offence to the lower house of convocation; and this learned body circulated a declaration, implicating the foreign critic, and others of similar sentiments, which Le Clerc himself, and many other persons, thought to be unjust and illiberal. Tindal also published a defence of his work, the second edition of which, in two parts, was ordered by a vote of the house of commons, to be burnt in the same fire with Sacheverel's sermons, in the year 1710. Some time after, the lower house of convocation, Atterbury being prolocutor, on a representation of the state of religion in the kingdom, animadverted on the dangerous consequences of the doctrine of necessity. To which Tindal replied, by asserting the truth and usefulness of that doctrine. Of the subjects and tendency of his political writings, it is needless to give any account. It will be sufficient to observe that he was an advocate for the Hanoverian succession, and for the Whig ministry of that period. Hitherto Tindal had made no direct attack against religion; but in 1730 he no longer disguised his sentiments, which were announced to the public in a treatise entitled "Christianity as old as the Creation, or the Gospel a Republication of the Religion of Nature." He disclaims, indeed, in words, opposition to the divine authority of the Christian religion, and denominates himself and his friends "Christian Deists;" but in reality it was his evident and avowed purpose to shew, that there neither has been, nor can be, any external revelation distinct from what he terms "the internal revelation of the law of nature in the hearts of all mankind." Tindal was attacked by Dr. Waterland, who treated him with a degree of contempt which called forth the animadversions of Dr. Middleton. The author, though declining in health, wrote in his own defence, but concretions of the gall-bladder, with which he had been long afflicted, terminated his life in the year 1733. His remains were interred in Clerkenwell church, agreeably to his own desire, near those of Dr. Burnet, bishop of Salisbury. A second volume of his "Christianity as old as the Creation" was left in MS.; but the publication of it was prevented by Dr. Gibbon, bishop of London. His first work had given occasion to so many unanswerable defences of Christianity, that the

learned bishop was unnecessarily alarmed, when he prevented further discussion of this interesting subject.

**TINDAL, NICHOLAS**, the nephew of the former, was educated at Exeter college, Oxford, and had different preferments in the church. He died in 1774, at a very advanced age, at Greenwich Hospital, of which he was chaplain. Among his literary undertakings, the most considerable was a translation of Rapin's History of England, with a continuation. *Biog. Brit.*

**TINDALE.** See **TYNDALE**.

**TINDEL**, in *Geography*, a town of Africa, in the country of Zenhaga, on the sea-coast; 18 miles S.S.E. of Cape Mirik.

**TINDERCOTTA**, a town of Hindoostan, in the Carnatic; 15 miles E. of Tiagar.

**TINDERO**, a town of Sweden, in the province of Medelpadia; 12 miles N.E. of Sundfwall.

**TINE**, in *Agriculture*, a term applied to a tooth or spike, which is set or placed in any kind of tool or implement, but especially those of the harrow, drag, and other similar kinds. Tines for this use should, for the most part, be a little curved or raked forward towards the points, as laying hold of the ground better, and in a more perfect manner. Sometimes tines are necessary to be steeled a little in the points and front edges, in order to prevent the wear of them, and render them more effective in tearing, cutting up, and dividing the land.

**TINE**, or *Tyne*, in *Geography*, a river of England, which rises in two streams, one called the North Tyne, which rises on the borders of Scotland, in the north-west part of the county of Northumberland; the other, which is called the South Tyne, rises about seven miles S. from Aldstone, in Cumberland: both these streams unite near Hexham, from whence the united stream proceeds to Newcastle, and from thence to the German sea, at Tinemouth.

**TINEA**, a river of France, which rises in the Alps, and runs into the Var, about 12 miles N. of Nice.

**TINEA**, in *Medicine*. See **PORRIGO**.

**TINEA**, in *Natural History*. See **MOTH**, &c.

**TINEH**, in *Geography*, a town of Egypt, situated between the fourth extremity of lake Menzaleh and the Mediterranean, near the ancient Pelusium, and on a canal formerly called the *Pelusian* or *Bubastic* mouth of the Nile; through which Alexander passed with his fleet from Gaza: this canal is now chanked up with mud; 80 miles N.N.E. of Cairo. N. lat. 30° 48'. E. long. 38° 45'.—Also, a town of Africa, in Tripoli, on a river which runs into the gulf of Sidra. N. lat. 30° 5'. E. long. 19° 12'.

**TINEHALY**, a post-town of the county of Wicklow, Ireland; 41 miles S. by W. from Dublin.

**TINEMAN**, in our *Old Writers*, a petty officer in the forest, who had the nocturnal care of vert and venison, and other employments in the forest.

**TINEMAR**, in *Geography*, a town of Ceylon; 10 miles S.W. of Trinkamaly.

**TINEMOUTH.** See **TYNEMOUTH**.

**TINET**, **TINETTUM**, in our *Old Writers*, is used for brush-wood and thorns to make and repair hedges. In Herefordshire, to *tine* a gap in a hedge, is to fill it up with thorns, that cattle may not pass through it.

**TINETO**, in *Geography*, a small island near the coast of Genoa, at the entrance of the gulf of Spezza. See **TINO**.

**TINEVELLY**, or **PALANCOTTA**, a city of Hindoostan, and capital of a province of the same name, in the Carnatic;

natic; 74 miles S.S.W. of Madura. N. lat.  $8^{\circ} 42'$ . E. long.  $77^{\circ} 46'$ .

TINEVELLY, a province of Hindoostan, bounded on the N. by Madura, on the E. and S. by the gulf of Manara, and on the W. by Travancore, from which it is separated by the Ghauts. The coast of this state is called the Fishing Coast, and has long been celebrated for its pearls. It was formerly in possession of the Portuguese. The fisheries are carried on by the natives, but the Dutch claim the sovereignty, and send two or three frigates to protect the boats, which sometimes amount to hundreds. The revenues of the country belong to the nabob of Arcot.

TINEWALD, the parliament or annual convention of the people of the Isle of Man, of which this account is given: the governor and officers of that island do usually summon the twenty-four keys, being the chief commons of it, once every year, viz. upon Midsummer-day, at St. John's chapel, to the court kept there, called the tinewald-court; where, upon a hill near the said chapel, the inhabitants of the island stand round about the plain adjoining; and here the laws and ordinances, agreed upon in the chapel of St. John, are published and declared unto them. At this solemnity the lord of the island sits in a chair of state, with a royal canopy over his head, and a sword held before him, attended by the several degrees of the people, who sit on each side of him, &c.

TING, in *Geography*, a city of China, of the second rank, in Pe-tche-li, near the river Tam; 107 miles S.S.W. of Peking. N. lat.  $38^{\circ} 32'$ . E. long.  $114^{\circ} 39'$ .

TINGAM, a town of Hindoostan, in the circar of Aurungabad; 20 miles E.S.E. of Aurungabad.

TINGAMOLLY, a town of Hindoostan, in the circar of Ruttanpour; 6 miles W. of Kyragur.

TINGANO, a river of Malacca, which runs into the Chinese sea, N. lat.  $5^{\circ} 27'$ . E. long.  $103^{\circ} 9'$ .

TINGAU, or TINCII, a town of Bavaria, late belonging to the abbey of Kempten; 7 miles N.E. of Kempten.

TING-CHAN, a town of the kingdom of Corea; 30 miles S.E. of Haimen.

TINGENTERA, ALGECIRAZ, in *Ancient Geography*, a town of Spain, in Bætica, towards the S.W. It appears to have been the same town with that called by Antonine "Portus Albus," and "Julia Traducta." It was the native place of Pomponius Mela.

TING-FAN, in *Geography*, a city of China, of the second rank, in Koei-tcheou; 992 miles S.S.W. of Peking. N. lat.  $26^{\circ} 5'$ . E. long.  $106^{\circ} 4'$ .

TING-HAI, a city and walled town of Chufan, on the coast of China, situated within a mile from the large open village or suburb, built along the shore. The way from the one to the other lies over a plain, intersected with rivulets and canals in various directions, and cultivated like a garden. The city walls are thirty feet high; and along these, at the distance of every hundred yards, are square stone towers. In the parapets are embrasures, and the holes in the merlons for archery, without cannon. The gate is double, and within it a guard-house, where military men were stationed, and the bows and arrows, pikes and matchlocks, were arranged in an orderly manner. Of the towns of Europe, Ting-hai most resembled Venice, on a smaller scale. The bridges are steep, and ascended by steps, like the Rialto; the streets are like alleys, or narrow passages, and paved with square flat stones. The houses are low, and mostly of one story. Attention to ornament was chiefly bestowed on the roofs of the houses; on the ridges of which were uncouth figures of animals, and other decorations in stone and in iron. The town was full of

shops, containing, chiefly, articles of clothing, food, and furniture, displayed to full advantage. Even coffins were exhibited to view in a variety of colours. The smaller quadrupeds, including dogs, intended for food, as well as poultry, were exposed alive for sale, as were fish in tubs of water, and eels in sand. The number of places where tin-leaf, and sticks of odoriferous wood were sold, for burning in their temples, indicated no slight degree of superstitious disposition in the people. Loose garments and trowsers were worn by both sexes; but the men had hats of straw, or cane, which covered the head, the hair, except one long lock, being cut short or shaved; while the women had theirs entire, and plaited and coiled, in a becoming manner, into a knot upon the crown of the head. Activity and labour universally prevailed. None asked alms, and none shunned labour. Staunton's Embassy to China, vol. i.

TINGI, a cluster of small islands in the Chinese sea, near the east coast of Malacca. N. lat.  $2^{\circ} 23'$ . E. long.  $104^{\circ} 21'$ .

TINGIA, a town of Peru, in the audience of Lima; 15 miles S.E. of Iça.

TINGIS, TANGIER, a town of Africa, situated upon a strait between the promontory, the coasts, and the mouth of the river Valon, according to Ptolemy, who furnished it Cæsarea. Mela says that it was a very ancient city, founded by the giant Antæus. It gave name to Mauritania Tingitana, of which it was the capital. Pliny says that it took the name of Julia Traducta, when the emperor Claudius sent thither a colony. Plutarch, in *Sertorio*, calls it Tingena, and says that a son of Tinga by Hercules, called Sophax, founded it, and gave it the name after that of his mother.

TIN-GLASS, a name frequently given to the semi-metal bismuth.

TING-NGAN, in *Geography*, a town of China, of the third rank, in Quang-tong, on the river of Limou; 17 miles S. of Kiong-tcheou, in the island of Hai-nan.

TINGO, or TENNA, a river of Italy, which runs into the Adriatic, 3 miles N. of Fermo.

TINGORAN, a small island in the Chinese sea, near the coast of Malacca. N. lat.  $4^{\circ} 8'$ . E. long.  $103^{\circ} 33'$ .

TINGORCALLY, a town of Hindoostan, in Bengal; 40 miles W.S.W. of Calcutta. N. lat.  $22^{\circ} 9'$ . E. long.  $87^{\circ} 53'$ .

TINGRACALLY, a town of Bengal; 16 miles E. of Mahmudpour.

TINGRECOTTA, a town of Hindoostan, in Bara-maul; 18 miles S.E. of Darampoury.

TINGRI, a town of Thibet. Here the Nepaulese were defeated by the troops of China in 1792; 22 miles S.W. of Zuenga.

TING-TCHEOU, a city of China, of the first rank, in Fo-kien; 870 miles S. of Peking. N. lat.  $25^{\circ} 48'$ . E. long.  $116^{\circ} 4'$ .

TINGUIRICA, a river of Chili, which runs into the Rahel; 40 miles from its mouth.

TINGUZGALPA, a town of Mexico, in the province of Nicaragua; 80 miles N.W. of Leon.

TINGWALL, a town of the island of Shetland; 4 miles W.N.W. of Lerwick.

TINGWALLA, an island of Sweden, in the north part of the Wenner lake, on which the town of Carlstadt is built.

TINIA, or TENEAS, in *Ancient Geography*, a river of Italy, in Umbria, which, according to Silius Italicus, ran into the Tiber.

TINIAN,

**TINIAN**, in *Geography*, one of the Ladrone islands, in the North Pacific ocean, about 42 miles in circumference, first discovered by the crew of a Manilla ship, which was cast away here in the year 1638. The author of Anson's Voyage gives a pleasing description of this island, as found by the crew of the Centurion, in the year 1742. Commodore Byron, who visited it in the year 1765, and anchored on the south-west end of the island, in the same place where the Centurion lay, instead of delightful lawns, found the trees and underwood so thick, that in endeavouring to force a passage through, they were entangled and cut as if with whip-cord. After they had cleared the well, which they imagined was the same at which lord Anson filled his casks, commodore Byron found the water brackish, and full of worms. He says, "the road also where the ships lay was a dangerous situation at this season (August 1st), for the bottom is a hard sand, and large coral rocks; and the anchor having no hold in the sand, is in perpetual danger of being cut to pieces by the coral; to prevent which as much as possible, I rounded the cables, and buoyed them up with empty water-casks. Another precaution also was taught me by experience, for at first I moored, but finding the cables much damaged, I resolved to be single for the future, that by veering away, or heaving in, as we should have more or less wind, we might always keep them from being slack, and consequently from rubbing, and this expedient succeeded to my wish. At the full and change of the moon, a prodigious swell tumbles in here, so that I never saw ships at anchor roll so much as our's did while we lay here; and it once drove in from the westward with such violence, and broke so high upon the reef, that I was obliged to put to sea for a week; for if our cable had parted in the night, and the wind had been upon the shore, which sometimes happens for two or three days together, the ship must inevitably have been lost upon the rocks. I soon found that the island produced limes, four oranges, cocoa-nuts, bread-fruit, guavas, and papaws in abundance; but we found no water-melons, scurvy-grass, or sorrel. Notwithstanding the fatigue and distress that we had endured, and the various climates we had passed through, neither of the ships had yet lost a single man since their sailing from England, but while we lay here two died of fevers, a disease with which many were seized, though we all recovered very fast from the scurvy. I am indeed of opinion that this is one of the most unhealthy spots in the world, at least during the season in which we were here. The rains were violent, and almost incessant; and the heat so great as to endanger suffocation: besides the inconvenience which we suffered from the weather, we were incessantly tormented by the flies in the day, and by the musquitos in the night. The island also swarms with centipedes and scorpions, and a large black ant, scarcely inferior to either in the malignity of its bite. Besides these, here were venomous insects without numbers, altogether unknown to us, by which many of us suffered so severely, that we were afraid to lie down in our beds: nor were those on board in a much better situation than those on shore, for great numbers of these creatures being carried into the ship with the wood, they took possession of every birth, and left the poor seamen no place of rest either below or upon the deck. Our principal resource for fresh meat was the wild hog, with which the island abounds. These creatures are very fierce, and some of them so large, that a carcass frequently weighed 200 pounds. Mr. Gore, one of our mates, at last discovered a pleasant spot on the north-west part of the island, where cattle were in great plenty, and whence they might be brought to the tents by sea. We were now upon the whole

pretty well supplied with provisions, especially as we baked fresh bread every day for the sick; and the fatigue of our people being less, there were fewer ill with the fever; but several of them were so disordered by eating a very fine-looking fish which we caught here, that their recovery was for a long time doubtful." The author of lord Anson's voyage says, that the people on board the Centurion thought it prudent to abstain from fish, as the few which they caught at their first arrival surfeited those who eat of them. Besides the fruit that has been mentioned already, this island produces cotton and indigo in abundance, and would certainly be of great value if it were situated in the West Indies. The surgeon of the Tamar enclosed a large spot of ground here, and made a very pretty garden, but he did not stay long enough to derive any advantage from it. Captain Wallis touched upon this island in 1767; and obtained beef, pork, poultry, papaw apples, bread-fruit, limes, oranges, and every refreshment mentioned in the account of lord Anson's voyage. The sick began to recover as soon as they went on shore; but flesh meat would not keep sweet for scarcely one day. N. lat. 14° 55'. W. long. 214° 7'.

**TINICUM**, a township of Pennsylvania, in the county of Bucks, containing 1017 inhabitants; 20 miles N. of Philadelphia.—Also, a township of Pennsylvania, in the county of Delaware, containing 249 inhabitants.

**TINIETZ**, a town of Aultrian Poland; 4 miles W. of Cracow.

**TINIMA**, a town of the island of Cuba; 22 miles W.N.W. of Bayamo.

**TINING**, in *Agriculture*. See **TINE**. See also **TILLAGE**.

**TININGBURG**, in *Geography*, a town of Hungary; 16 miles N. of Presburg.

**TINISSI**, a town of Bohemia, in the circle of Konigin-gratz; 10 miles S.E. of Konigin-gratz.

**TINIT**, a town of Africa, in Zanhaga, on the coast; 25 miles S.S.E. of Cape Mirik.

**TINJULEEN**, a town of Africa, in the country of Darah; 105 miles S.E. of Morocco. N. lat. 29° 30'. W. long. 5° 30'.

**TINKER'S ISLAND**, one of the Elizabeth's Islands, near the coast of America.

**TINKLING** or **TINGLING** of the Ear. See **TINITUS**.

**TINMOUTH**, in *Geography*, a post-town of the state of Vermont, in the county of Rutland, containing 1001 inhabitants; 8 miles S. of Rutland.—Also, a town of Nova Scotia, on the east coast, formerly called *Piñou*.

**TINNA**, or **TINA**, in *Ancient Geography, a river of the isle of Albion, between the gulfs Tava and Boderia, according to Ptolemy, supposed to be the river Eden, in Fife.—Also, a small river of Italy, in Picenum.*

**TINNE'**, in *Geography*, a town of Africa, in Masina, on the north side of the Niger; 130 miles W.S.W. of Tombuctoo.

**TINNING**, the covering or lining any thing with melted tin, or with tin reduced to a very thin leaf.

Looking-glasses are foliated or tinned with thin leaves of beaten tin, applied and fastened to them by means of quick-silver. See **LOOKING-GLASS**.

Kitchen utensils are tinned with melted tin; and locks, bits, spurs, &c. with leaf-tin, by the help of fire.

For the method of tinning iron-plates, see **LATTIN** and **TIN-Plates**.

Copper and brass are covered over with tin by the help of sal ammoniac, the acid of which cleans the surface of the

metals to be tinned, and the oily matter contained in it furnishes the phlogiston (according to the old system) that is necessary in this operation. The copper, or brass, being made hot enough to melt tin laid upon it, is strewed over with sal ammoniac, and the melted tin rubbed about the plate. The sal ammoniac takes up the dross of the tin, and leaves the tin to flow freely upon the metal. As the surface of copper is continually altered by the mere action of the air, the workmen, before the tinning of any vessel, scrape its surface with a steel instrument till it be clean and bright; then they place the vessel upon kindled coals, and heat it to a certain degree: as soon as it is hot, in some processes of tinning, they rub it with pitch, and apply the melted tin, which they spread upon the surface of the copper by means of lards. For this purpose pure tin is seldom used; but, in general, two parts of tin are alloyed with one part of lead.

The pitch used in this latter mode of tinning is quite necessary, because the degree of heat given to the copper is sufficient to calcine its surface in some degree: and this alteration, however slight, would prevent the perfect adhesion of the tin, unless by means of the pitch the phlogiston was restored to it at the very instant of the application of the tin. The pitch also prevents the slight calcination which would happen on the surface of the tin, or revives the small particles of calx which are formed during the operation. In either way, or in the method of tinning iron plates, the success of the operation depends on the facility with which tin unites with these metals, which incorporates with them, dissolves in some measure their surface, and forms a kind of alloy, at least when the tinning is well performed; and moreover, on the cleanness of the surfaces, both of the melted tin, and of the copper or iron to which it is applied; for the metals cannot perfectly unite unless they are in a metallic state, and free even from their own earth or calx.

It has been alleged that copper vessels, so pernicious in themselves, are not perfectly preserved from rust or verdigris by tinning; and, besides, tin itself is combined with arsenic, and lead is also used in tinning. M. Malouin has, therefore, proposed in his Memoirs on Zinc (Mem. de l'Acad. Sc. 1742.) to substitute that semi-metal in place of lead and tin, for the tinning of iron and copper vessels; the greater hardness of the zinc, it is thought, would render it less liable to be worn, and the dangerous effects of lead and tin would be avoided. Macquer's Dict. Chem. Engl. edit.

The plumbers, on some occasions, tin or whiten their sheets of lead: in order to which they have a tinning furnace, filled with live coal, at the two sides of which two men are placed, who hold up the sheets over the fire to heat: and the tin-leaves being laid over them, as fast as the sheets grow hot, and the tin melts, they spread it, and make it take by rubbing it with tow and resin.

**TINNITUS AURIUM.** A very common disease in the sense of hearing, is when certain sounds, like those of a drum, a bell, the falling of water, &c. are heard, when no such noises actually exist, or can be heard by other persons. This affection is called *tinnitus aurium*, of which various kinds have been observed. For the most part, it is a very slight transient disorder; but sometimes it is most obstinate, long continued, and troublesome. It sometimes arises from the slightest cause, such as any thing partially stopping up the meatus auditorius, or Eustachian tube itself, so that the free passage of air into the cavity of the tympanum is interrupted. A kind of tinnitus is heard by the most healthy when they yawn.

A much more frequent and troublesome species of tinnitus accompanies many diseases both of the febrile and nervous kind. This is said to be occasioned partly by the

increased impetus of the blood towards the head, with an increase of sensibility in the nervous system itself, so that the very beatings of the arteries are heard; and partly by the augmented irritability and spasmodic motions of the little muscles within the organ of hearing. In fevers, the throbbing of the carotid arteries at the sides of the sella turcica has produced excessive annoyance in particular individuals, especially when they were in the recumbent posture; and the celebrated Haller informs us, that when he was afflicted with fever, he suffered much from the beating sensation caused in his ears, as he supposed, from the pulsation of the carotids in the neighbourhood of those organs.

According to writers, *tinnitus aurium* sometimes arises from a vehement affection of the mind; sometimes from a disorder in the stomach; sometimes from rheumatism extending its effects to the ears and head; or from a catarrh, producing a temporary obstruction in the Eustachian tube. In the foregoing examples, the cure of the affection of the ear depends upon the removal of the other disorders, of which it is merely an effect.

In certain cases, *tinnitus aurium* occurs as a separate independent disorder, and may be the cause of long-continued, distressing suffering. The existence of unreal sounds in the organ of hearing generally prevents the patient from hearing distinctly other sonorous impressions, and, of course, more or less deafness is a common attendant of the complaint.

The writer of this article lately had a patient, who is attacked five or six times every year with *tinnitus aurium*, which causes for several days the most annoying sensations in the ears, and a considerable degree of deafness. The disorder is always accompanied with severe pain in the branches of the nerve coming out of the infra-orbital foramen, head-ache, indigestion, and many symptoms of the nervous and bilious kind.

In this case, relief is obtained by fomenting the affected ear with a decoction of poppies, and washing out the meatus auditorius with a syringe and warm water. However, these means are always assisted with a few doses of calomel and rhubarb, without which, in all probability, the local applications would not entirely answer.

We have also had other cases, in which a strong solution of opium in water, camphorated oil, blisters, &c. were the remedies employed.

The *tinnitus aurium*, produced by fevers, sometimes does not subside at their termination, but lasts, either in a continued or periodical form, during life. Two such instances are now within our own recollection; and every man of experience must have witnessed the same thing.

**TINNUNCULUS**, in *Ornithology*, the name of one of the long-winged hawks, called by Linnæus *FALCO tinnunculus*; which see.

It is about the size of a common pigeon. Its bill is short, crooked, and very sharp, and covered with yellow skin at the top; near this the bill is white, elsewhere it is blue; its tongue is bifid; its mouth very wide, and its palate blue; its head is large and flattened, and is of an ash-colour, with longitudinal streaks of black; its back and wings are brown, variegated with black spots; its rump is grey, with some transverse black spots; and its breast and belly of a pale rust-colour, with a few longitudinal streaks of black; its tail is long and pointed, its tip of a pale ferruginous hue, with a broad transverse streak of black over it; and the rest of the tail is a mixed grey and brown, with black spots and streaks; its legs and feet are of a fine yellow.

The tinnunculus, or kestrel, breeds in the hollows of trees, in the holes of high rocks, towers, and ruined buildings:

buildings: it lays four eggs, which are white, variegated with a number of red spots; its food is field-mice, small birds, and insects.

This is the hawk which we so frequently observe in the air fixed in one place, and as it were fanning with its wings, at which time it is watching for its prey. It flings up the indigested fur and feathers in form of a round ball. Ray and Pennant.

TINO, in *Geography*, a small island near the coast of Genoa, at the entrance of the gulf of Spezza; 8 miles S. of Spezza. N. lat. 44° 3'. E. long. 9° 40'. See TINETO.

TINO. See TENOS.

The form of this island is oval, about 60 miles in circumference. It is mountainous, but its rich plains are decked by the opulence of industry. Its fruits are excellent and its wine good; but the most abundant of its productions is silk, which is manufactured by the females, who are highly commended for the beauty of their persons and the elegance of their dress. The inhabitants are active and industrious, most of whom are of the Greek church, though it is the see of a Roman Catholic bishop. It is reckoned one of the most agreeable islands of Greece, but has no good harbour. The small town of San Nicolo is built on the ruins of the ancient Tenos. Its capital bears the name of the island. N. lat. 37° 36'. E. long. 25° 7'.

TINPHADUM, or TIMPHADUM, in *Ancient Geography*, a place of Africa, in Numidia, upon the route from Theveste to Sitifis, between Theveste and Vegefela. Ant. Itin.

TINSEDA, in *Geography*, a town of Africa, in the country of Darah. N. lat. 27° 30'. W. long. 5° 46'.

TINTA, a town of Peru, in the bishopric of Cusco, and jurisdiction of Canas y Canches, sometimes also called Tinta; 60 miles S. of Cusco.

TINTENIAC, a town of France, in the department of the Ille and Vilaine; 9 miles S.S.E. of Dinan.

TINTINNABULUM, among the *Ancients*. See BELL.

TINTO, in *Geography*, a river of Spain, in the province of Seville, which owes its name to its waters being tinged of a yellow colour. It is also of a petrifying quality; and it is said that it destroys all verdure, and that no fish can live in it. Its nature, however, is changed by the confluence of other rivulets; for when it passes by Niebla, it is not different from other rivers: and it falls into the Atlantic, six leagues lower down, at the town of Huelva, where it is two leagues broad, and admits the passage of large vessels as high as San Juan del Puerto, three leagues above Huelva.

TINTON, a town of the state of New Jersey, near the sea; 12 miles E. of Freehold, in the county of Monmouth.

TINTOQUE, a town of Mexico, in the province of Xalisco; 45 miles S.S.W. of Compostella.

TINTORETTO, IL, in *Biography*, the cognomen of a celebrated Venetian painter, whose real name was Giacopo Robusti. He was born at Venice in 1512, the son of a dyer; from whence he acquired the name of Il Tintoretto. His natural disposition towards the art of drawing manifested itself very early, and his father had the wisdom to indulge it; and seeing it likely to lead to something decisive, caused him to be instructed in painting, and finally placed him as a pupil with Titian, then in the prime enjoyment of his reputation and power. It is a painful thing to relate, and a severe lesson to the pride of the most able, that where so much ability, so much honour and wealth abode, the mean and degrading passion of jealousy should have found encouragement. Titian, the great, the honoured Titian, that man who possessed a mind capable of grasping almost all the art of painting required, who was richly and highly honoured, courted, and employed, is said (and the truth of

the story rests upon too sound authority) to have seen with the corroding pangs of jealousy the early essays of his pupil Tintoretto, and to have permitted it to operate so strongly upon him, that he excluded the dreaded object from his house, about ten days after his admission.

But the aspiring talents of the young painter were not to be damped by so mean a measure, though even in the powerful hands of Titian. To him dismissal from the eye of a master was emancipation. He dared to think for himself, and boldly aimed at selection in art, and an union unthought of till then; and as Lanzi says, generously aspired at the honour of being the founder of a school and style of his own, by combining the form of the great Florentine, M. Angelo, with the colour of his former master. To maintain a due excitation to the performance of so bold an undertaking, he wrote upon the wall of his study, "Il disegno di Michel Angelo e il colorito di Tiziano;" and with all the ardour of an intrepid mind, endeavoured to perfect the task he had assigned himself, by copying whatever pictures of Titian he could procure during the day, and drawing by night from casts taken from the works of M. Angelo, together with many others he procured from ancient basso-relievos and statues. It is doubtless to his studies by night and the lamp, that he acquired that perfect mastery of chiaro-scuro, those decided masses of light and shade, which distinguish his works, both in their groups and single figures. Add to these labours, that he modelled in wax and clay, and clothed his figures studiously, arranging them in different lights, and sometimes hanging them from the ceiling, to acquire, by drawing from them in that position, the knowledge of the *sotto in su*, then much in use for the adornment of ceilings, and in the houses of the grandees. By these deep studies, and a perfect knowledge of anatomy, he was enabled to exert the exuberant and glowing fancy with which nature had blessed him, in the freest and boldest manner; and had he always applied his powers with equal intenfeness, with a careful discrimination of what was due to his own honour, there can be no doubt but that he would have left a name unrivalled in art. This for some time he attended to, and some of his best works lack only character and expression to place them in the highest rank. The large picture which lately adorned the walls of the Louvre, but is now returned to its original station, the Scuola di S. Marco at Venice, is a work of this class, which he painted when only 36 years old; and another is the Crucifixion, in the Scuola di S. Rocco. The former is known by the name of Il Servo, and represents the miracle of St. Mark descending, and breaking the bonds of a slave condemned to death by Turks. Grand but not correct in its style of design, astonishing the mind by the intrepid boldness of its colour and execution, it displays more complete mastery of the materials of art than is to be found in the works of any other painter. If there be any fault in this astonishing performance, it is that the subject is lost in the splendour of the execution, the spirit in the matter in which it is embodied. The same cannot be said of the Crucifixion above mentioned, in which the lowering deep and ominous tone preserved through the whole, produces the most perfect unity, gives strength of expression to the picture, and overwhelms the spectator with terror. All seems to be lushed in silence round the central figure of the Saviour suspended on the cross, with his fainting mother, and a group of male and female mourners at his feet; and though many are the improprieties of costume and of action, yet all vanish in the power which compresses them to a single point, and we do not detect them till we recover from the first impression. Unhappily for his fame, he was not always so careful in his labours;

labours; and the impetuosity of his mind, or perhaps the feelings of his employers, who were numerous, did not allow him sufficient time to do justice to himself; and he permitted many pictures to leave his easel, possessing only the freedom of colour and execution which peculiarly belonged to his pencil.

Tintoretto was so certain of his execution, that he is said by Sandrart to have frequently wrought without a previous sketch, or any preparatory outline, finishing as he went on, and adapting his labours to the price he was to receive; not sufficiently considering that his works would outlive their author, and deprive him of a large portion of the fame so justly due to his power, when efficiently exercised. It was, therefore, truly observed by An. Caracci, that in some of his works, Tintoretto was not inferior to Titian, while in others he fell below himself.

One remarkable instance of his intrepidity and impetuosity of genius, and promptness of execution, is related by Vafari, *viz.*: The confraternity of S. Rocco at Venice had determined to decorate their church with a picture of the apotheosis of their patron saint, and, desirous of having the choice of good designs, commissioned some of the most eminent artists to make compositions for their selection. Paulo Veronese, A. Schiavone, Salviati, Zuccherro, and Tintoretto, were the competitors. On the day appointed for their decision, the good fathers were astonished to find a finished picture by Tintoretto placed in the appointed situation; and when they remonstrated upon so extraordinary a proceeding, as they had only required a design from him, he told them that was his way of making designs, and that if they hesitated to pay him for his trouble, they were welcome to the picture, which was allowed to keep possession of its honours. His competitors rendered due justice to so extraordinary an exertion, and denominated him *Il furioso Tintoretto*.

To do justice to the power of Tintoretto, he must be contemplated on the grand theatre of his pictorial excellence, *viz.* at Venice, where alone his grander works are to be found; and there the public buildings are filled with them, in the higher and lower degrees of excellence. In style, the grandeur which he borrowed of Michael Angelo was rather muscular enlargement of line, and that not always correct, than select or characteristic; and it is not often that he rises above common nature; mostly so in his female characters, though they are often too slender for truth of action, and too affected for grace. His touch is delightfully free, with a full impasto of colour, and his chiaro-scuro of the richest and most brilliant kind. He lived to the great age of 82, and died at Venice in 1594.

Tintoretto left a daughter named Marietta Robusti, who was born at Venice in 1560, and whom he instructed in the art of painting, principally in portraiture, in which she acquired considerable practice and reputation; painting many of the principal personages in her native city. She had the honour to be invited to the courts of the emperor Maximilian and of Philip king of Spain; but her father would not be prevailed upon to part with her. She died soon after him, in 1590. He left also a son, Domenico Robusti, who practised the art with considerable success, though not with the fire of invention or execution which characterize his father's productions. He was born at Venice also, in 1562. His principal works are in the Sala di Consiglio and the Scuola di San Marco at Venice. Portraiture was, however, his principal occupation, and most suited to his genius; and he had the honour of being eminently patronized. He died in 1637.

TINURTIUM, TOURNUS, in *Ancient Geography*, a

town of Gaul, on the route from Lugdunum to Geforiacum. Anton. Itin.

TINUS, in *Botany*, a name in Pliny, book 15, chap 30, for what he says is sometimes termed a sort of wild laurel, and is distinguished by the blue colour of its berries. This description is universally agreed to apply to our *Laurus-tinus*, *Viburnum Tinus* of Linnæus; a plant likewise indicated by Ovid's

*Et bicolor myrtus, et baccis carula tinus.*

Linnæus has transferred this name to a West Indian shrub, supposed by him to constitute a new genus, having some resemblance to the above shrub.—Linn. Gen. 200. Schreb. 270. Juss. 264 and 451.—Class and order, *Enneandria Monogynia*.

The characters of this however were discovered by Swartz to be founded in error, the plant being a genuine species of *CLETHRA*; see that article, n. 5.

The origin of the word *Tinus* has been sought by Vaillant in the Greek *τινος*, *small*, or *dwarf*, as meaning a smaller or more humble kind of laurel; but this is scarcely correct, nor does the derivation by any means satisfy us.

TINZ, in *Geography*, a town of Silesia, in the principality of Brieg; 22 miles W. of Brieg.

TINZULIN. See TINJULEEN.

TIO, a town of South America, in the province of Cordova; 70 miles E. of Cordova.

TIOGA, a county of New York, erected from Montgomery county in 1791, and from the E. part of this county. The county of Brome was erected in 1806. Tioga is bounded N. by a small angle of Steuben county, and by Seneca and Cayuga counties, E. by Brome county, S. by the state of Pennsylvania, and W. by Steuben county. Its form is nearly that of a square, 26 by 34 miles; its area 571,306 acres: between 42° and 42° 25' N. lat., and 2° 14' and 3° W. long. from New York. Its towns are Condon, Caroline, Catharinas, Cayuta, Chemung, Denby, Elmira, Owego, and Spencer its capital. Its eastern part is traversed by the Susquehanna; and the Tioga, the principal W. branch of that river, waters the S.W. part. The surface is considerably broken and hilly. It is rapidly increasing in population, and contains a large proportion of good farming land. Rafts, arks, and small boats descend the waters of this county, and find the principal market at Baltimore, in Maryland. Tioga sends one member to the house of assembly.

TIOGA, a large township in the S.W. corner of Brome county, 13 miles W. of Chenango Point; bounded N. by Berkshire, E. by Union, S. by the state of Pennsylvania, and W. by Tioga county; about 15 miles long from N. to S., and 7 broad, having the Susquehanna running W. across its centre. The soil is various, and the surface uneven. It yields various kinds of trees, grain, and pasture. Fruit in general succeeds well, and apples are no where better. This town has been settled since about 1790.—Also, a river of New York, which runs into the Susquehanna at Tioga Point, N. lat. 41° 56'. W. long. 76° 33'.

TIOLO, a town of Italy, in the Valteline; 10 miles S.W. of Bormio.

TION, a river of France, which runs from the lake of Annecy to the Siers.

TIOOKEA, one of King George's islands, in the South Pacific ocean, discovered by commodore Byron. It is a low island, with a large lake in the centre. Captain Cook sent to examine a creek, which he supposed communicated with the lake. They found the creek fifty fathoms wide at the entrance, and thirty deep; farther in thirty wide and twelve deep; the bottom every where rocky, and the sides bounded with coral rocks: dogs seemed to be in great plenty, but no fruit

fruit was seen but cocoa-nuts. The inhabitants of this island, and perhaps of all the low ones, are of a much darker colour than those of the higher islands, and seem to be of a more savage disposition. This may be owing to their situation, nature not having bestowed her favours on these low islands with that profusion she had done to some of the others. The inhabitants are chiefly beholden to the sea for their subsistence; consequently are much exposed to the sun and weather, and by that means become more dark in colour, and more hardy and robust, for there is no doubt of their being of the same nation. Captain Cook's people observed that they were stout well-made men, and had marked on their bodies the figure of a fish, a very good emblem of their profession. S. lat.  $14^{\circ} 27'$ . W. long.  $144^{\circ} 56'$ .

TIORA, in *Ancient Geography*, a town of Italy, in the country of the Sabines, on the route from Reate to Litta, between Vatia and Litta.

TIORN, in *Geography*, an island in the North sea, near the west coast of Sweden, about 25 miles in circumference, containing three parishes, and abounding in excellent pastures. N. lat.  $58^{\circ}$ . E. long.  $11^{\circ} 29'$ .

TIORNEBIERG, a small island in the Baltic, near the fourth coast of Laland. N. lat.  $54^{\circ} 42'$ . E. long.  $11^{\circ} 18'$ .

TIORNEHOLM, a small island in the Baltic, near the fourth coast of Laland. N. lat.  $54^{\circ} 39'$ . E. long.  $11^{\circ} 37'$ .

TIOS, TIEUM, or *Tion*, in *Ancient Geography*, a town of Asia, in Paphlagonia, which lay, according to Ptolemy, on the coast of the Euxine sea, between Pfyllium and the mouth of the river Parthenius.

TIOUGHNIOGA, in *Geography*, a river of New York, which runs into the Chenango, N. lat.  $41^{\circ} 56'$ . W. long.  $76^{\circ} 53'$ .

TIPARA, a town of Hindoostan, in Onde; 10 miles S.E. of Gooracpaur.

TIPARENUS INSULA, now *Specia*, in *Ancient Geography*, the isle of Tiparena, situated in the Argolic gulf, separated by a small canal from the continent, which established a communication between the gulfs Hermione and Argolic.

TIPASA, TIPSA, a town of Africa, in Mauritania Cæsariana, according to Ptolemy and the Itin. Anton. having the title of colony, and situated on the route from Carthage to Tingis, between Cæsarea Colonia and Casæ Caluenti. It still preserves its ancient port, and has some remains of ancient walls.

TIPE, or TYPE, in *Rural Economy*, a trap or device of the wooden box, or excavated earth kind, for catching or taking rabbits, &c. These types or traps are set or formed in a particular track at the time the rabbits have departed from the warrens, or parts of them, in search of food, all the other holes or ways of return being stopped up. Dogs are then employed in forcing the rabbits to return, when they are taken in the types or traps. The types are formed of different numbers and sizes, according to the nature and extent of the warren.

TIPER, or TIPRA, in *Geography*, a country of Asia, annexed to Bengal, bounded on the N. by Silhet, on the E. by Ava, on the S. by Chittigong, and on the W. by Dacca, about 100 miles long, and 50 broad: the inhabitants are said to be most subject to goitres or wens in the throat, a disease generally attributed to the water drank. Comillah seems the chief town. A town of the same name is laid down in some maps, as situated on the river. N. lat.  $24^{\circ} 20'$ . E. long.  $110^{\circ}$ .

TIPHA, in *Ancient Geography*, a small town of Greece, in Bœotia, situated on the gulf of Corinth, in which was a

temple of Hercules, whose feast was annually celebrated. Pausanias.

TIPHCA PRINCEPS, one of the Hebrew accents, sometimes serving for a comma, and marked under a letter thus ( $\acute{}$ ).

TIPHIA, in *Entomology*, a genus of the Hymenoptera order of insects, in the Gmelinian system of Linnæus; the characters of which are, that the mouth has a membranaceous roundish jaw, a mandible arched, and acute, a short tridentated lip, and no tongue; the feelers are four, filiform, unequal, stretched out in the middle of the lip; and the antennæ uniliform and arched. This genus includes the following

## Species.

VESPIFORMIS. Black, with a ferruginous abdomen, black at the base, and cyaneous wings. The sphex vespi-formis of Fabricius. Found in Malabar.

CRASSICORNIS. Black, the abdomen with three bands, the legs ferruginous, and the wings cyaneous. Found in Spain.

NIGRA. Black, without spots. An European insect.

FEMORATA. Black, with the four hinder thighs angulated and red. Found in England.

HISTRIONICA. Black, thorax maculated, abdomen with five yellow bands, the two foremost interrupted. Found in China.

QUINQUECINCTA. Black, thorax spotted, abdomen with five yellow bands, the second interrupted. Found in England.

VARIEGATA. Thorax black, varied with yellow, abdomen yellow. A Siberian insect.

CILIATA. Black, the segments of the abdomen yellow, with ciliated margin. Found in Spain.

HÆMORRHOIDALIS. Black, the abdomen with five yellow spots on each side, the toes and legs red. Found in South America.

EPHIPPUM. Black, the thorax with a red dorsal spot. Found in South America.

RADULA. Hairs black, thorax reddish before, the second and third segments of the abdomen yellow. Found in New Holland.

DORSATA. Black, the second and third segments of the abdomen yellow. A Coromandel insect.

RUFICORNIS. Ferruginous spotted with black, yellow abdomen, and four black bands. Found in Tranquebar.

TRICINCTA. Black, the abdomen with three yellow bands, the anus and legs ferruginous. Found in South America.

COLLARIS. Black, the thorax on the fore-part cinereous villous, behind refuse, with cinereous wings. Found in Malabar.

MORIO. Black, with brown wings, posterior thighs banded with cinereous. Found in Spain.

PEDESTRI. Apterous, black variegated with yellow, thorax compressed. Found in New Holland.

TIPHLE, in *Ichthyology*, a name by which some authors express the acus, or tobacco-pipe fish.

TIPICA, in *Geography*, a town of Peru; 30 miles E. of Lipes.

TIPING, a town of Corea; 25 miles S.E. of Kingki-tao.

TIPIOCA, or TAPIOCA, a name given by some authors to a sort of cream or flour made from the yuca or manihot-root, by maceration of it in water, after expressing the juice.

TIPOR, in *Geography*, a town on the west coast of Celebes. S. lat.  $2^{\circ} 5'$ . E. long.  $119^{\circ} 22'$ .

TIPPACANOE CREEK, a river of North America, which

which runs into the Wabash, N. lat.  $40^{\circ} 18'$ . W. long.  $86^{\circ} 56'$ .

TIPPAL, a river of England, in Northumberland, which runs into the Tyne, near Haltwhistle.

TIPPERARY, a county in the province of Munster, Ireland, extending in a very irregular form between the King's and Queen's counties on the north, the latter county and that of Kilkenny on the east, the counties of Waterford and Cork on the south, and those of Limerick, Clare, and Galway on the west. From the two latter counties, the river Shannon forms a natural boundary; as the river Suir does from Waterford for about 15 miles on the south. The length from north to south is 52 Irish (or  $73\frac{1}{2}$  English) miles, and its breadth 31 Irish (or  $39\frac{1}{2}$  English) miles. It contains 554,950 acres, or 867 square Irish miles, equal to 882,398 acres, or 1420 square English miles, including bogs, mountain, and waste. There are twelve baronies, two of which, Upper and Lower Ormond, gave the title of duke, as they now do that of earl, to the family of Boteler, or Butler, so distinguished in Irish history. The population of Ireland not having yet been satisfactorily ascertained, little can be said on the subject. Dr. Beaufort stated the number of houses in 1792, at 30,703; and from the means of information he had, and his usual accuracy, there can be little doubt of his correctness: but from the great increase of tillage since that time, the number of houses must have increased, though Tipperary has had more causes to retard this increase than any other county in Ireland: 30,703 houses, at an average of  $5\frac{1}{2}$  souls *per* house, would be about 169,000; but if, according to Mr. Bushe's opinion, as given in the Transactions of the Irish Academy, we take  $6\frac{1}{2}$  as the average, it would exceed 190,000, a very small population for such an extent of ground. The number of parishes is 187, which, when Dr. Beaufort wrote, were comprised in 63 benefices, and had only 46 churches. A number of churches have however been since built, as well as several glebe-houses, and some benefices have been divided; to which the exertions of the present archbishop of Cashel (Brodrick) have greatly contributed. Unions of parishes which were formed, when from the state of the country the income of a parish was very small, and the number of inhabitants very few, are now as unnecessary as they are injurious. The archbishopric of Cashel, and bishopric of Emly, which are united, contain 116 parishes, Waterford 32, and Killaloe 41. Tipperary returns four members to the imperial parliament, two knights of the shire, and two for the boroughs of Clonmell and Cashel. This reduction was less than in most other counties, as Tipperary had only three boroughs before the Union, of which Feathered was disfranchised. Though the towns represented are considerable ones, especially Clonmell, yet the boroughs are both what are called *close* ones, the proprietors in fact exercising an undisputed right of choosing the member. The lands of Tipperary have been always ranked amongst the most productive in Ireland, and one tract in particular, including the neighbourhoods of Tipperary and Cashel, has been called the *Golden vale*, on account of its extraordinary fertility. It has however been always a great grazing country; and as this system drives the peasantry into barren mountains, or forces them to crowd into towns and villages, that they may procure a precarious and wretched subsistence, they too commonly become turbulent, violent, and discontented. Whether this be the cause or not, such is certainly the character of the peasantry of this county, who have been engaged in every disturbance, and who are now groaning under an insurrection act, attended with enormous expence, which the usual parliamentary opponents of government could not

object to, and which, though there is an apparent calm, it would be yet unsafe to repeal. The increase of tillage would operate favourably, but the exemption of grazing land from every kind of tithe, operates as an encouragement to it, which the present state of the market for grain is not likely to counteract. Whilst, however, Tipperary contains a considerable portion of very fertile land, it has also extensive tracts of bog and mountain. Of the former, the most extensive is a tract lying in the north-east of the county, between the towns of Roscrea, Templemore, Urlingford, Littleton, and New Birmingham, and forming a part of the Great Bog of Allen. This was surveyed by Mr. Ather, of Cattle-comer, under the directions of the commissioners for enquiring into the nature, extent, &c. of the bogs of Ireland; and from his report it would appear, that about 36,000 acres, mostly in this county, might be easily reclaimed, and at a moderate expence, on account of the favourable situation for draining, and the abundance of limestone gravel, of which the district is principally composed, and which is the best material for reclaiming them. To the south of this range of bog, and situated between the small town of Killenaule and the county of Kilkenny, is the coal district. It resembles what has been called the Leinster coal district in the very able geological and mining report lately given of that district by Richard Griffith, esq. mining engineer to the Dublin Society. It seems indeed to be only a continuation of that district, and is separated from it by a secondary limestone country. The species of coal is the carbonaceous or stone-coal, better known by the name of Kilkenny coal. To the south of this, and in the south-eastern angle of the county, is Sliebh-na-man mountain. On the borders of the county of Waterford, over the town of Cloghen, are the Knockmele-down mountains, which occupy a considerable space in both counties. Nearly parallel to these, and north of them, are the lofty Galtees, extending from the borders of Cork and Limerick to the town of Cahier. Between these and the town of Tipperary is the lower range, called Sliebh-na-muck; but the greatest extent of mountain crosses the county from south-west to north-east, running from the county of Limerick to the Queen's county, and completely separating the two Ormonds from the rest of the county. The high hills adjoining Limerick are called the Keepe mountains, from the height of them, which is a remarkable object to the traveller and the adjoining country. The hills near the small town of Silvermines, have been marked in some maps as the Silvermines mountains; others have been called the Devil's Bit; and adjoining the Queen's county, they take the name of the Sliebh-bloom mountains. In this district, lead and copper mines have been wrought with various success; and some parts of it afford fine mill-stones. The river Suir rises in the north of the county, near Roscrea, and flows from north to south, when it takes an eastern direction, and becomes the boundary between it and Waterford. This and its tributary streams afford an abundant supply of water; and turn a very great number of boulding-mills. The western division of the county has the Shannon for its boundary, and is well watered by the streams which flow to it from the range of mountains above mentioned. Clonmell, on the Suir, and at the southern extremity of the county, is the shire-town, and though very inconveniently situated for the assizes, has an excellent gaol, court-house, &c. It is a place of considerable trade, and one of the principal inland towns of Ireland. Cashel, Roscrea, Nenagh, Tipperary, Carrick, and some others mentioned in their proper places, are of respectable size, but none of them distinguished for trade or manufactures, unless we except the manufacture of ratteens

ratteens at Carrick. Tipperary was, previous to the arrival of the English, a part of the kingdom of Munster; sometimes separated as an independent sovereignty under the kings or princes of Cashel. The name Ormond is a corruption of Oir Momond, *i. e.* East Munster, and was so called in opposition to Desmond, South Munster, and Thomond, North Munster. After the English settlement, the O'Briens were confined to Thomond, the Fitzgeralds established themselves in Desmond, and the Butlers became the possessors of Ormond and Kilkenny, acknowledging indeed the sovereignty of England, but maintaining such authority as rendered it only nominal. The counties of Kilkenny and Tipperary were palatinates; and it was not till the attainment of the duke of Ormond, in 1716, that this distinct jurisdiction was abolished. As the inhabitants of Tipperary were actively engaged against the Protestants in 1641 and the succeeding years, great forfeitures took place on Cromwell's success, and many of the present landholders are descendants from his officers: Tipperary abounds with ruins. The number of old castles is very great, some of them boldly situated, and forming very striking objects to the traveller: such as the castle of Ardfinnan, built by king John, and that of Cahier, on an island in the Suir. The chief ecclesiastical ruins are those of Holycross, Monaincha, and Cashel, which all deserve to be visited by the curious. No statistical account has been published of the county of Tipperary, and there appear to be very scanty materials for its history.

TIPPERARY, a market and post-town in the county of the same name, 87 miles S.W. from Dublin, and about 20 miles N.W. from Clonmell, on the road to Limerick. Its name is said to be in Irish Tiobrad-arain, signifying the *well* of the territory called *Arain*. The town is not large, and appears to be in a ruinous condition, though it was formerly of sufficient importance to give its name to the county. The adjoining county is very rich, and there are some fine seats, especially Thomastown, the splendid seat of the earl of Llandaff, descended from the Mr. Matthew whom Swift visited; and Damers-Court, a seat of the earl of Dorchester. In the neighbourhood are the ruins of Emly, the church of which was once the metropolitan church of Munster, and which still gives name to a bishopric, united to the archiepiscopal see of Cashel.

TIPRA. See TIPERA.

TIPREE, a dry measure at Bombay; where the candy contains 8 parahs, the parah 16 adowlies, 64 fcers, or 128 tiprees. Rice is sold by the batty measure, in which the morah is = 4 candies, or 25 parahs, the parah 20 adowlies, 150 fcers, or 300 tiprees. A candy is = 25 Winchester bushels nearly.

TIPSA, in *Geography*, a town of Algiers, in the province of Constantina, on the borders of Tunis, near the banks of the Melagge, anciently called *Tipasa*; at present a frontier city and garrison of the Algerines. This place, which enjoys a fine situation, with some mountains at a small distance, still preserves the principal gate, several fragments of old walls, and other marks of the rank and figure it formerly obtained amongst the cities of Numidia; 85 miles S.E. of Constantina. N. lat. 35° 27'. E. long. 8°.

TIPSTAVES, officers appointed by the marshal of the king's bench, to attend the judges with a rod or staff tipped with silver, and take charge of such persons as are either committed, or turned over at the judge's chambers.

The denomination is also sometimes given to those more frequently called *boffons*; who are the wardens of the Fleet's officers, attending the king's court with a painted staff, for the taking into custody such prisoners as are committed by

the court; and to attend such prisoners as go at large by licence.

TIPUL, in *Natural History*, a name given by the people of the Philippine islands, to a species of crane common there, and so tall, that when it stands erect, it can look over a man's head. See DONGON.

TIPULA, in *Entomology*, a genus of the Diptera order of insects, the characters of which are, that the mouth has a very short proboscis, membranaceous, canalculated on the back, receiving a bristle; the haustellum short, without a vagina; the feelers two, incurved, equal, filiform, longer than the head: the antennæ are mostly filiform.

The smaller species of this genus so much resemble gnats, that the generality of authors, not excepting even Goedart and Swammerdam, have confounded the two genera, and described these among the gnats.

The long form of the body, the position of the wings, and the length and position of the legs, are the circumstances that make the resemblance between the gnats and tipulæ; but the structure and organs of the head are alone a very sufficient distinction.

As the tipulæ differ from the gnats in the figure of the mouth, and in being without a trunk, they differ as much from the other flies of that character, by their resembling the gnat in the shape of their body. They differ also in the conformation of the mouth, and its several parts and organs. The opening of the mouth is a slit extending itself from the fore part of the head toward the hinder part, and its lips cannot be called upper and lower; but they are lateral ones. When the body of the creature is pressed, this mouth opens, and shews what seem to be a second pair of lips within. These are more firmly closed than the others, and resemble only certain duplications of the flesh. The exterior lips are cartilaginous, and are furnished with short hairs; the interior are perfectly smooth, and of a fleshy texture. The head of the tipula is of a long and slender figure; the lips are articulated at the extremity of this head, and on each side there stands, on the upper part, a sort of beard, which, when minutely examined, is found to be articulated in the manner of the antennæ of insects. These two beards, in their usual position, are placed close together, and bent forwards over the head; their office seems to be the covering of the aperture of the mouth. These seem constantly to be found in all species of the tipulæ, and placed exactly in the same manner.

The largest species of tipulæ are usually found in our meadows, and these are in no danger of being confounded with the gnat kind, their size alone being a sufficient obvious distinction. These are often found of nearly an inch in length from head to tail; but their bodies are very slender, and are composed of only nine rings. The male tipula is easily distinguished, at sight, from the female; it is much shorter in the body, and is thicker at the tail than any where else; this tail also usually turns upwards, whereas that of the female is placed in the same line with the body, and is slender, and composed of several scaly parts, proceeding from the last ring of the body. These creatures are found in our meadows through the whole summer; but the end of September and beginning of October is the time when they are most of all plentiful.

The legs of these creatures are greatly disproportioned to the body, according to the common rules of nature, especially the hinder pair, which are in the larger species usually three times the length of the body.

This large species is a creature of no great beauty; its body is of a brownish colour, and its corcelet is so elevated, that the creature seems hump-backed; the head is small, and

## TIPULA.

the neck very short; the reticulated eyes are so large, that they cover almost the whole surface of the head; these are of a greenish colour, with a cast of purple, when viewed in some lights. Reaumur supposes that two very lucid specks, on the anterior part of the breast, are eyes, though placed in so very singular a manner; the wings of this creature are long, but very narrow, and seem scarcely well proportioned to the size of the animal; they are transparent, but have a slight cast of brown; and their ribs, when viewed by the microscope, appear beset with scales, or feathers, in the manner of those of the gnat kind. Some species of the tipulæ have them also fringed with these scales at the edges; there are no ailerons, or petty wings, at the origin of these, but in the place of them there are two very fine balancers or mallets; these have long pedicles, and roundish or oval heads; the stigmata of the corcelet are four; one pair is placed immediately underneath these balancers, and the other immediately below the first pair of legs; the first pair is very long, the others small, and those on the rings of the body, if there be any, are too small for our sight, even with good glasses. Each ring of the body is composed of two half cylinders, which are joined into one, by means of a membrane, which gives them room to distend or close up at the creature's pleasure. The large tipulæ all carry two antennæ, or horns, upon their heads; but these are of no remarkable structure, they are only composed of a great number of joints, each covered with a fine downy hairiness; and at the joining of each to the next, there is a tuft of longer and more stiff hairs. This is the description of the common large tipulæ which we find in the meadows, and in almost all its parts is applicable to the generality of the larger species of these insects.

The smaller kinds are very numerous, and of great variety. These are frequent in all places, and at all seasons of the year; the spring shews us immense clouds of them, and even the coldest winter's day shews a great number of them in the sun-shine about noon. These creatures fly much better than the larger tipulæ; they seem indeed to be almost continually upon the wing, and their manner of flight is very singular; they are continually mounting and descending again, and that without quitting the direction of the line in which they go forward; this they will often do for many hours together. In tracing these flies from their origin, they are all found to be produced from worms which have no legs, and have a regular scaly head. Those from which the larger tipulæ are produced live under ground; they are most fond of marshy places, but any ground will do that is not often disturbed. They usually are found at about an inch under the surface, and are so plentiful in some places as greatly to injure the herbage.

These creatures do not find it necessary to their living, that plants should be upon the surface of the earth in which they live. There is frequently found in the hollows of the stumps of old trees, a sort of earth which seldom produces any vegetables; yet the female flies of this species well know that their young will find a proper subsistence there; and there are usually found great numbers of them in all these places. The hollow elms and willows, so common in our hedges, and by ditch sides, afford innumerable proofs of this: but it must be observed, that they are only found in such earth of this kind as is continually somewhat moist.

M. Reaumur mentions a very singular species of large tipulæ, which was produced with him from one of the worms found in the earth of an old elm; this was of the larger kind, and had some beautiful spots on the wings. It had also a very elegant tufted antenna; whereas, in the common large tipulæ, these are plain and simply granulated

ones, as well in the males as females. Reaumur's Hilt. Inf. vol. ix. p. 7, &c.

The numerous species are distributed, by Gmelin, into several classes, as follow:

\* *With patent Wings.*

**PECTINICORNIS.** With pectinated antennæ; the wings with a black spot; the thorax yellowish. Found in moist places in Europe.

**RIVOSA.** With hyaline wings; rivules brown, with a snowy spot. Frequent in Europe.

**SINUATA.** With white wings, sinuated margin and spots brown; cinereous body, and ferruginous feet. Found in the north of Europe.

**QUADRIMACULATA.** With wings brown-veiny, margin and four spots brown; abdomen above yellowish. There is a variety denominated *calmariensis*. Found in the meadows of Europe.

**CROCATA.** With wings having a brown spot; abdomen black, yellow bands. Frequent in the north of Europe.

**OLERACEA.** With hyaline wings; the margin of the rib brown. Found in Europe at the roots of pot-herbs, grain, &c. &c.

**HORTORUM.** With hyaline wings; scattered obsolete spots. Found among the pot-herb plants of Europe.

**TRICOLOR.** With whitish wings; the exterior margin and bifid apex brown. Found in North America.

**TRIANGULARIS.** With wings dimidiate-brown, and white triangular spot. Found in Scotland.

**VARIEGATA.** Black; base and sides of the abdomen red, spotted with yellow. Found in the gardens of Europe.

**CONTAMINATA.** Black, with white wings; two bands, and a point black. Found in moist places of Europe.

**LUNATA.** With ash-coloured wings, and white marginal lunule. Found in the meadows of Europe.

**TURCICA.** With veiny wings; white marginal lunule; cinereous body, and abdomen with a black dorsal line.

**PRATENSIS.** With variegated thorax; brown abdomen; sides spotted with yellow; front tawny. Found in the meadows of Europe, destroying the roots of grasses.

**DORSALIS.** Yellowish; brown back; hyaline wings; marginal spot black. Found in Germany and Italy.

**PLUMBEA.** Brown-cinereous, with white wings; rib and nerves black. An Italian insect.

**TERRESTRIS.** With hyaline wings; brown marginal point; back of the abdomen cinereous. Found in Europe. See *CRANE-Fly*.

**CORNICINA.** With hyaline wings, marginal point brown; abdomen yellow; three lines brown. Found in Europe at the roots of plants.

**NIGRA.** With brown wings, and black body. Found among the plants of Europe.

**ALBIMANA.** Black, with testaceous thighs, and hinder tarsi white.

**COSTALIS.** Sordidly yellow; with antennæ twice longer than the body; hyaline wings, and brownish costa. Found in Van Diemen's Land.

**CLAVIFES.** Brown; with tarsi annulated with white in the middle; ovated, incrassated. Found in North America.

**ATRATA.** With glaucous wings; marginal point and body black; first segment of the abdomen and feet red. An European insect.

**BIMACULATA.** With hyaline wings; two brown spots; the middle of the abdomen spotted ferruginous; plumose antennæ; as the former.

**ANNULATA.**

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**ANNULATA.** With wings variegated with brown; thighs with white rings; as the former.

**OCELLARIS.** With whitish wings, very numerous, blackish, ocellar spots. North of Europe.

**CINEREA.** With whitish wings, three brown spots, cinereous unspotted body. A Norwegian insect.

**FASCIATA.** With whitish wings, four brown flexuose bands; abdomen and feet yellowish. Found in the marshes of Sweden.

**MELANOCEPHALA.** Testaceous; head and dorsal line of the thorax black; wings hyaline; three brown streaks. A Cayenne insect.

**SEXPUNCTATA.** With white wings; three marginal brown points, thorax compressed, yellow; dorsal line black. Found in Italy.

**FLAVIPES.** Brown, with obscure wings spotted cinereous, and three brown costal spots; feet yellowish; joints brown.

**TRIPUNCTATA.** With hyaline wings; three marginal points brown; yellow body. Found in Italy.

**FLAVESCENS.** With unspotted wings; yellow body; brown back. Found in the fields of Europe.

**ENSIFORMIS.** With lanceolate ferrulate antennæ; wings, veins, and spot black. Found in Sweden.

**REGELATIONIS.** With hyaline glofly wings; cinereous brown body. Found frequently in Europe.

**PILIPES.** Cinereous; with striated brownish wings; fore-most legs hairy

**MORIO.** Black; with white wings; marginal point brown; pallid feet.

**REPLICATA.** With hyaline wings; margin slender, recurved; body brown; simple antennæ. Found in the waters of the north of Europe.

**MONOPTERA.** Black; with feet and feelers pallid. North of Europe.

**ARUNDINETI.** Whitish; villose antennæ; black eyes. Found among the reeds of Europe.

**BARBICORNIS.** Black; with plumose antennæ; simple at the apex. Found occasionally in Europe.

**GIGANTEA.** With wings brown, hyaline, waved longitudinally in the middle. Found in the gardens of Austria and France.

**VENOSA.** With hyaline wings; veins brown, and brown margin. In Upper Austria.

**PPLICATA.** Cinereous; with hyaline wings; brown veins; external margin and middle line interwoven in small folds. Upper Austria.

**PUNCTATA.** With hyaline wings, pointed with black; exterior margin spotted with black. As the former.

**PHRAGONITIDIS.** Yellow; with black head, hyaline wings, and three black points. Found among the reeds in Austria.

**LINEATA.** Yellow; pointed with three lines on the thorax, and four on the abdomen. Austria and Carniola.

**OCREATA.** Black; with hyaline wings, spotted and pointed with black; the band before the hinder tarsi white. Upper Austria.

**BIFASCIATA.** Yellow; with hyaline wings, subfasciated with brown. Upper Austria.

**DEPRESSA.** With cinereous thorax; abdomen yellow, depressed; wings yellowish-brown; four marginal spots brown. An European insect.

**DISCOLOR.** Cinereous; abdomen on both sides yellowish; wings with brown and white spot. As the former.

**PECTINATA.** Black; with antennæ semi-pectinated; glaucous wings; marginal point and apex large; thighs and legs red; apices black. As before.

**VERSICOLOR.** Yellow; thorax yellow, spotted with black; abdomen and back, beneath and sides, cinereous; wings, veins, and spot brown. As before.

**MACULOSA.** Black; bill, legs, and apex of abdomen yellowish; wings with feathered brown spots. As before.

**LUTEA.** Pale yellow; with yellowish wings. As before.

**FUSCIPES.** Black; with two yellowish bands on the abdomen; white wings, spotted with black; yellowish legs, joints, and soles; with the toes brown. As before.

**QUADRIFASCIATA.** Cinereous-yellowish; with grey wings; four yellowish bands, and margin of costa pointed; with yellow legs; black joints. As before.

**OCTOPUNCTATA.** With white wings; eight black points; black abdomen; thorax and legs palish. Found at Paris.

**PARISIENSIS.** Green; with hyaline wings; brown band; the two bands of the abdomen and anus black. As before.

**SECALIS.** Cinereous; with ciliated wings; eyes, antennæ annulated with white; the apex of the abdomen and feet black. Found in fields of rye. Gmelin queries whether the two last species belong to this tribe of insects.

\* *With incumbent Wings*: "Culiciform."

**PLUMOSA.** With greenish thorax; white wings; brown point; and plumose antennæ. In the marshes of Europe.

**LITTORALIS.** Greenish; with unspotted wings; and fore-legs very long. In the maritime parts of Europe.

**CINCTA.** Livid; with wings and three marginal spots black; the abdomen black, annulated with white. Found in Sweden.

**MOTITATRIX.** With fore-legs very large and motatory; with white ring. Frequent in Europe, yellow-green.

**PILICORNIS.** Blackish; fore-legs as before; thorax lined; white wings unspotted.

**FASCICULATA.** Black; fore-legs as before; sides of the abdomen spotted with ferruginous. Found in Germany.

**TENDENS.** Ferruginous; with white unspotted wings; fore-legs very long and pale. In marshes of Denmark.

**VIBRATORIA.** Fore-legs very large, motatory; white at the apex. Found in marshes of Europe.

**VARIA.** Brown; fore-legs elongated; abdomen yellowish; wings varied with white and black.

**TREMULA.** Fore-legs very long, motatory; black, with white wings. In the marshes of Sweden.

**FLEXILIS.** Fore-legs motatory, all pallid; wings with duskyish band. In the watery places of Europe.

**MONILIS.** With white legs, nine black rings; wings varied with white and cinereous. In the gardens of Europe.

**ZONATA.** Pallid; with wings, two bands, and three points brown; thighs with brown angle. Found in Orford.

**VIRENS.** Green; with unspotted wings; brown soles. A Swedish insect.

**VIRIDULA.** Green; with antennæ verticillate, hairy; pallid legs. North of Europe.

**GENICULATA.** Beneath yellowish; lines of the thorax and back of the abdomen black, with white immaculate wings.

**PALLIPES.** Smooth-brown; with hyaline unspotted wings, and palish legs.

**MACROCEPHALA.** Greenish; with eyes and back of the thorax black. In the marshes and moist shores of Europe.

**PUSILLA.** Green; with three black spots on the hinder

part of the thorax; antennæ of the male plumose. In the lakes of Europe.

**MARCI.** Black, smooth; with blackish wings; fore-thighs furrowed inwards. In the dunghills and putrescent soil of Europe: probably a variety of *hortulana*?

**THOMÆ.** Black, smooth; with black wings; sides of the abdomen marked with a saffron line. At Upsal.

**CHRYSANTHEMI.** Black, smooth; the abdomen red at the base; the antennæ incrassated, pilose. On the *chrysanthemus coronarius* of Spain.

**FERRUGINATA.** Black, smooth; brown wings; abdomen brown-ferruginous. South of Europe.

**JOHANNIS.** Black, smooth; white wings; black point; short antennæ; black legs. In shady parts of Europe.

**POMONÆ.** Black, smooth; hyaline wings; black point; ferruginous thighs. In the plains of England and Norway.

**RUFICOLLIS.** Black, smooth; red thorax. At the Cape of Good Hope.

**BREVICORNIS.** Black, smooth; with wings blackish at the margin; abdomen brown; fore-shanks spinose. In the shady gardens of Europe.

**PUTRIS.** Brown; the base of the wings cinereous. In the teeming soil at the commencement of spring.

**FEBRILIS.** Black, oblong, hairy; with blackish wings. An European insect in close places.

**INSULARIS.** Black, hairy; with ferruginous legs, hinder elongated.

**FORCIPATA.** With cylindric black abdomen; wings brown-hyaline; anus appendiculated. An English insect.

**VERNANS.** Cinereous; thorax black-lined; white wings spotted with brown. In meadows of Denmark.

**FLORILEGA.** Black, filken. On the apple-flowers of Europe, which it destroys.

**HORTULANA.** With hyaline wings; exterior margin black. In the flowers of asparagus and apple.

**PHALLENOIDES.** With wings deflexed, cinereous, ovate-lanceolated, ciliated. In the walls of dunghills and mixens of Europe.

**HIRTA.** Hairy; with wings deflexed, ovate-ciliated, tessellated with white and black. In Lapland.

**PENSICARIÆ.** Black; with wings incumbent, fusciciliated; under the leaves of the peach-tree.

**NOTATA.** Black; with white wings; with a white spot in front of the sides of the abdomen. In Europe.

**JUNIPERINA.** Cinereous; with white wings; margin villous; found in the juniper.

**CULICIFORMIS.** Cinereous, with pallid legs; wings marked with two blackish spots. At Upsal.

**INCARNATA.** Incarnated; with moderate antennæ. At Upsal.

**PALUSTRIS.** Pallid; black head; reddish abdomen. In marshes of Europe.

**LONGICORNIS.** With antennæ longer than the incarnated body. In moist places of Europe.

**RUFIPES.** Black; with red legs; wings black in the middle; yellowish at the base. North of Europe.

**STICTICA.** Black; segments of the abdomen white at the apex; wings with a brown point. In Germany.

**PALLIDA.** Pallid, pilose; legs punctated with black. In Germany.

**HAFNIENSIS.** Brown; lateral line of the thorax and legs whitish, unspotted.

**FLABELLICORNIS.** Pallid; abdomen annulated with black; wings spotted. Germany.

**BIPUNCTATA.** Brown; wings cinereous; marginal point white. Found in Europe.

**SERICEA.** Black; back black; sides of the thorax bare; balancers yellow. In Sweden.

**MINUTISSIMA.** Yellow; eyes concurring in the vertex black. In the ditches of Sweden and Austria.

**PULICARIS.** Black; sides of the thorax, scutellum, and abdomen yellow. In the ditches of Europe.

**PENNICORNIS.** With antennæ bipectinate; black body; halteres, or balancers, white. In the flowers of *aristolochia clematis*.

**SCATHOPSE.** Black; antennæ moniliform; with wings incumbent hyaline. In the privies of Austria.

**BUXI.** Yellow; head and thorax black; wings brown incumbent. In the box-tree of Europe.

**BERBERINA.** With wings incumbent, fuliginous; spotted white at the base and margin. In the excrescences of the barbery.

**LUTESCENS.** Yellowish; three brown spots on the back; antennæ plumose. Found in Europe.

**TRIFASCIATA.** Ferruginous; with three bands on the wings. In Europe.

**MULTICOLOR.** Yellowish body; greenish abdomen; white wings with a brown band. As before.

**ALBA.** Grey; with white wings and abdomen; the apex of the latter brown. As before.

**CARBONARIA.** Black; legs ferruginous; wings hyaline. As before.

**PLUMICORNIS.** Brown; antennæ brownish-plumose; legs yellowish. As before.

**DICHOA.** Black; legs ferruginous. As before.

**LEUCOPTERA.** Brown; apex of abdomen and legs pale yellowish; wings white. As before.

**MOSCHIFERA.** Wings cinereous; thorax and abdomen yellow. Found in Chili.

**TIPULA WASP.** See *WASP Tipula*.

**TIQUADRA,** in *Ancient Geography*, one of the small islands situated near the Balearic islands, near the town of Palma.

**TIQUINA,** in *Geography*, a town of Peru, in the diocese of La Paz; 55 miles N.N.W. of La Paz.

**TIR,** a town of Persia, in the province of Khorasan; 40 miles N. of Herat.—Also, a town of Persia, in the province of Farfistan; 50 miles N.E. of Schiras.

**TIRABOSCHI, GIROLAMO, Abate,** in *Biography*, author of the best history of Italian literature which that country, fertile in men of learning, taste, and talents, has produced. He was born at Bergamo in 1731, and is styled *Cavaliere* by his biographer, and the last editor of his History, in a life prefixed to the index of the second edition, published at Modena in 1794. He had his education in the Jesuits' college from fifteen till the abolition of the order. He was professor of eloquence in the university of Brera at Milan till the year 1770, when he was appointed præfect of the Este library at Modena, by the interest of count Firmian. He first distinguished himself, after this appointment, by a new edition of the Italian and Latin Vocabulary of Mandosio; which work was almost wholly new written by him, and corrected and augmented with the most refined purity of the two languages; and the Latin and Italian orations which he delivered publicly at Milan, two of which were printed, and established his reputation for eloquence.

He distinguished himself during the first years of his præfectorship of the duke of Modena's library, by drawing up a new catalogue of the manuscripts, books, medals, gems, and rarities of that celebrated library, and compiled the first volume of his History of Italian Literature, published in 1771, which manifested such taste and solid learning

learning as astonished his readers; but the public in general was still more astonished at his finishing the whole work in eleven years, consisting of thirteen large volumes in 4to.; a work which, by its immense erudition, profound critical discussions, and judgment in every kind of literature, acquired him the praise of the whole republic of letters.

Besides this great work, he produced during the same period the life of St. Olympia; a letter on the comparative excellence of Italian and Spanish literature; the life of Fulvio Testi; the two first volumes of the Biblioteca Modenese; and all the articles which he furnished to the twenty-three first volumes of the Giornale di Modena, a kind of review and history of new books and discoveries in arts and sciences within the year.

He was knighted by the duke of Modena, though a regular ecclesiastic, and ennobled by his fellow-citizens at Bergamo. To enable him to proceed in his great work with more convenience, his patron augmented his appointment, and gave him an assistant in the library.

His correspondence with the learned throughout Europe must have occupied much of his time: as at his decease, among his papers were found materials for twenty-eight volumes of original letters addressed to him as author of the Literary History of Italy, and editor of the Giornale di Modena. In his numerous minor productions, as well as in those of greater volume and importance, he discovers himself to have been gifted with a quick penetration, and possessed of great facility in writing, as well as a clear conception of the works of others, which to have acquired, must have been studied with constant application.

This admirable writer died at the age of sixty-two, of a bloody flux, in 1794.

From this celebrated work, we expected to acquire new and authentic information concerning the rise and progress of music previous to the seventeenth century, in a country which has taught every other part of Europe all the refinements of the art, a country in which we fought in vain, by travelling, conversation, and the perusal of all the books written by the natives which we could procure on the subject, to trace the origin of Italian melody. Dull and pedantic elementary books we procured in abundance; but scarcely any that we could read with pleasure, previous to the establishment of the opera at the beginning of the seventeenth century. Quadrio's heavy volumes are filled without taste, selection, or solicitude concerning the authenticity of facts. Padre Martini, unfortunately for modern musical history, did not live to finish his plan; having advanced no farther than the ancient music of the Greeks.

Tiraboschi is copious on all other parts of literature, arts, and sciences. It is only on music, and musical writers, our peculiar research, that we have ever found him unsatisfactory: we never consulted him on any other subject unprofitably. The little he tells us of Pythagoras, Aristoxenus, the Etruscans, and Guido, we had often previously read in innumerable books in various languages.

He speaks of the Lyric poetry of the Greeks and Romans; but that of the Italians has not furnished an article. We did hope to be informed what kind of melodies were set to the songs of Dante, Petrarca, and Boccaccio. We could not reasonably expect specimens of this melody in notation, any more than prints of pictures and buildings that are mentioned in his work; but when a capital work of Raphael, Michael Angelo, or Palladio is mentioned, we are generally told where it is to be seen, or at least where it has been seen. Had Tiraboschi told his readers where the original melodies to the songs of the old Italian poets

were to be found, it would have been a great satisfaction to those who consult books for useful and solid information, or seek in them for any thing but mere amusement.

Of the last century he says nothing, as his plan went no farther than the end of the seventeenth century. And, indeed, of that period, his information is very scanty; neither Carissimi nor Stradella, the two best composers which Italy had then produced; nor among contemporary theorists, or writers on harmonics, is any notice taken of Lemme Rossi, or Daniel Bartoli, authors of two books, which in a general history of literature ought to have been mentioned. See BARTOLI, and ROSSI.

TIRACHEA, in *Ancient Geography*, a town of Judea, in the Decapolis, on the coast of the sea of Galilee.

TIRADE, in *French Music*, formerly implied what the Greeks meant by *αγωνα*, *agogo*, *duetus*, the filling up a wide interval by the intermediate diatonic notes. (See GREEK *Music*.) But, at present, *tirade* seems nearly equivalent to *volata* in Italian; a division, a flight.

TIRAGHT, in *Geography*, an island in the Atlantic, near the W. coast of Ireland; 8 miles S.W. of Dunmore-Head.

TIRAMANGALUM, a town of Hindoostan, in Madura; 10 miles S.W. of Madura.

TIRAMANY-MUTOO, a river of Hindoostan, which runs into the Cauvery; 8 miles N. of Carroor.

TIRAN. See TYRAN.

TIRANADUM, or TIRINADUM, in *Ancient Geography*, a town of Africa, in Mauritania Cæsariana, on the route from Carthage to Cæsarea, between Rapidum and Caput-Cillanum. Anton. Itin.

TIRANDURG, in *Geography*, a town of Hindoostan, in Myfore; 12 miles S.S.E. of Ouffoor.

TIRANO, a town of Italy, in the department of the Lano, late belonging to the Grisons, the capital of the Upper Terzero, and residence of a governor called Podesta, on the Adda, which divides it into two parts, connected by a stone bridge of a single arch: formerly surrounded with walls by Ludovico Sforza, as a defence against the Grisons, who destroyed the fortifications when they gained possession of the Valteline. The chief trade is in wine and silk, which is not considerable. The wine is sent into the country of the Grisons, to Bormio, and into the territories of Venice; the silk, which is drawn from this district of the Valteline, is not of the best quality, nor very abundant; part is forwarded to Venice, and the remainder, through Chiavenna, to Germany. About half a mile from the town, on the other side of the Adda, is the church of the Madonna, or Virgin, much visited by Catholic pilgrims; the modern building annexed to what remains of the old edifice is in an elegant style of architecture, and the era of it is 1533, the ancient part having been erected in 1206. In the area before the church is held the fair of Tirano, remarkable for the number of cattle brought hither for sale; they are fed upon the highest Alps, where they continue until the snow begins to fall, and are chiefly sent from hence into Italy. The fair is in October, and lasts three days, during which time the authority of the podesta is suspended, and the governor of the Valteline has absolute jurisdiction over the town and the district; 24 miles E.N.E. of Morbegno.

TIRANY, a town of Hindoostan, in the Carnatic; 3 miles N. of Ootatore.

TIRATA, in old *Italian Music*, implied a regular ascent or descent of notes of the same kind; but, at present, the term has a more extensive acceptation than its original import, *drawn out*: as when a subject is well treated, productive

ductive of beautiful passages, made the most of by a composer; it is then said to be *ben tirato*.

TIRBIA, in *Geography*, a town of Spain, in Catalonia; 16 miles N.W. of Urgel.

TIRE, or, as the seamen pronounce it, *tier of guns*. See TIER.

TIREBOLI, in *Geography*, a river of Turkish Armenia, which runs into the Black sea at Tireboli.—Also, a town of Turkish Armenia, on the Black sea, at the mouth of a river of the same name; 20 miles N.E. of Kerefour.

TIREH, a town of Asiatic Turkey, in Natolia, situated on the Meinder; the inhabitants are chiefly Turks; 32 miles S.S.E. of Smyrna. N. lat.  $38^{\circ} 8'$ . E. long.  $27^{\circ} 40'$ .

TIRES of *Wheels*, in *Rural Economy*, the straps, slips, bands, or hoops of iron which are put round them for the purpose of guarding and protecting them against the effects of the roads, as well as securing and keeping them tight in their different parts. The most advantageous and beneficial form of tire for wheels of different kinds and breadths in different points of view, have probably not yet been well ascertained. It is obvious, however, that it should be such as may have the least possible tendency to penetrate and destroy the surfaces on which the wheels act and move. It would appear, that almost all of those who have written on this subject, have gone upon a wrong or false principle; nearly all having directed that the exterior surface, when more bands than one are used, as in the case of broad-wheeled waggons, should be unequal; in such a manner as that the centre band may receive the whole of the pressure, when the road is even and composed of hard materials; the other bands being only in readiness to sustain their portions of the burthen, when, either from unevenness or the want of firmness in it, they may be brought into contact with it.

It is well known, however, to every one, that it is the nature of a wedge to work its way, when forcibly applied to a cleft or opening; and that the extent of its penetration will depend on the sharpness or acuteness of its wedge-form, and the power by which it is impelled. Admitting this to be the fact, it is plain that every wheel, the tire of which acts in the smallest degree as a wedge, must enter a loose soil, surface, or road, more or less, in proportion as its edge or projection is more or less acute and protruding, or the contrary.

A rolling cylinder is not easily capable of penetrating below the surface, for this reason, that it presents no *one protruding* point; but where a rolling body swells out in a projecting manner in the middle, it will unquestionably act or work deeper in that part where it is the most prominent, than in any other, as it is a sort of obtuse wedge. And such must be the case in every wheel of which the tire is not cylindrical; as when its protruding part gets in, the whole body soon finds its way.

A broad flat tire is not, however, without its inconvenience; as, whether the road be good or bad, it presents the same surface, and, of course, is as much resisted in its front, while on a hard surface, as while on one into which it sinks. Consequently, the cylindrical tire can never draw light and free, though it will not by any means penetrate deeply into any tolerably sound surface.

Flat tires are probably, however, the best of any for narrow wheels.

In consequence of the above, it has been proposed by some, that every wheel should be furnished with a *concave* or hollow tire which is cylindrical; but, that after leaving two rims, of proportionate breadth, at the edges, the whole

intermediate space should be scooped out, or otherwise hollowed. By this means, on hard roads, the wheel would ride on the two rims only: while on soft roads, the whole would bear up the burthen. All such wheels, the tires of which have even the smallest tendency to a wedge-like form, invariably, it is said, throw the soil or earth from them; squeezing it out at the sides, and burying themselves, not only in the furrows they make, but under the very mud which they force from out of them: while, on the contrary, the concave tire, it is supposed, keeps in the soft soil, unless, indeed, it be in an absolutely floppy state, and forces it, by compression, to bear up the weight or burthen. It is observed, that let two wheels be tried on a meadow which is not very firm in its surface, the cylindrical tired wheel will, assuredly, act better than that with a receding or convex edged sort of tire; but that the concave tired wheel could not, it is believed, fail to display its superiority in several of the most desirable points and respects.

Let it be supposed that the tire of a waggon-wheel is nine inches in breadth, and cylindrical: at the two edges leave a band of one inch in breadth, or more; then groove out the intermediate space, to an inch and a half in depth in the centre, rounding it in gradually. Such a tired wheel would, it is said, on a hard road, present only two inches of bearing; while the resistance would gradually increase in proportion as the incumbent weight, and the softness of the surface over which it may be proceeding, should bring the whole to bear in an equal manner. The soft soil could not escape so easily, at least, it is conceived, from under a concave tire, as those of the opposite kind, consequently it could not add to the exterior impediments of wheels.

It must nevertheless be admitted, it is said, that the concave tire is liable to some disadvantage; for instance, it will at times clog, and, possibly, not only choke its own groove, but even accumulate considerably more; which will adhere to the clay and other matters with which the groove may be filled. In this way, it would, in fact, it is thought, become, in a certain measure, cylindrical. But that if it did no more than fill its groove on heavy soils, it would not prove so highly objectionable; for, on such, the whole breadth of the tire *ought* to press the soil or surface.

The remedy suggested for the above inconvenience, in such cases, is that of a suitable fixed scraper, which has no difficulty in it, at least, for carriages on one pair of wheels, or for the hind wheels of waggons. Such a scraper, and the mode of fixing it in such cases, may be seen described in speaking of scrapers for different kinds of implements, tools, &c.

These hints and suggestions may be useful in leading to farther improvements on the tires of wheels, which is a matter of great importance in different points of view, and which, as has been seen, has yet been thought but little upon in a proper manner. See WHEEL.

TIREYMEG LAKE, in *Geography*, a lake of North America. N. lat.  $61^{\circ} 52'$ . W. long.  $107^{\circ}$ .

TIRGUBIS, or TIGUBI, in *Ancient Geography*, a town of Asia, in Mesopotamia, on the banks of the river Chaboras, according to the Theodosian table and Ptolemy; situated N.W. of Resaina.

TIRGUL, in *Geography*, a town of European Turkey, in Moldavia; 62 miles W. of Jassy.

TIRGULFORMOSA, a town of European Turkey, in Moldavia; 20 miles W. of Jassy.

TIRING,

'TIRING, in *Falconry*, is the giving a hawk the leg or pinion of a fowl to pluck at. *Dict. Rust.*

TIRIPANGADA, in *Ancient Geography*, a town of India, on this side of the Ganges. *Ptol.*

TIRIPIN, in *Geography*, a sea-port of South America, in the province of Cumana.

TIRISTA, in *Ancient Geography*, a town of Lower Myfia, near the Danube, between Trimanium and Duruf-torum. *Ptol.*

TIRISTRIA, or TETRISIA, a promontory of Lower Myfia, on the Euxine sea, between Dionysopolis and Oedessus. *Ptol.*

TIRKA, in *Geography*, a town of Africa, in the kingdom of Ghana, on the north side of the Niger; 120 miles E. of Ghana. N. lat.  $15^{\circ} 20'$ . E. long.  $14^{\circ} 30'$ .

TIRLEMONT, a town of France, in the department of the Dyle, called by the people of the country *Tienen*; on the Geete. It was anciently one of the principal cities of Brabant, and made a fourth quarter in the assembly of the States; but that precedence was afterwards removed to Bois-le-Duc. It certainly has been a very flourishing and populous city, and many vestiges of its grandeur are yet visible; but it has suffered much by war, and other calamities; 9 miles S.E. of Louvaine.

TIRMAKUL, a fort of Hindoostan, near Gooty, taken by the British in 1801.

TIRMANIZ, a mountain extending from Bukovina to Transylvania.

TIRNA, a river of Hungary, which runs into the Danube, a few miles below Presburg.

TIRNAU, a town of Hungary, containing nine churches, and as many convents. This town was built in the thirteenth century; 20 miles E.N.E. of Presburg. N. lat.  $48^{\circ} 24'$ . E. long.  $17^{\circ} 44'$ .

TIROAN. See TARON.

TIROCOOR, a town of Hindoostan, in Golconda; 8 miles S. of Caloor.

TIRRETÓ, a town of Naples, in Calabria Ultra; 15 miles E.S.E. of Reggio.

TIRROUP-MEW, a town of the Birman empire: the meaning of the word is the *Chinese city*, and the appellation was derived from a victory obtained over the Chinese some centuries ago, when they invaded Birmah; 35 miles N.E. of Pagan.

TIRSÆ, in *Ancient Geography*, a town of Macedonia, in Mygdonia.

TIRSCHENRIED, in *Geography*, a town of Bavaria; 28 miles N.N.E. of Amberg.

TIRSCHNITZ, a town of Bohemia, in the circle of Kaurzim; 4 miles N.W. of Kosteletz.

TIRSIO, in *Ichthyology*, a name given by Gaza and some other authors to the phocæna of Willughby and others, the *porpessæ* or *marsum*. Pliny, Bellonius, and many others call it *tursio*.

TIRSURM, in *Geography*, a town of Sweden, in East Gothland; 25 miles S. of Linkioping.

TIRUA, a small island in the Pacific ocean, near the coast of Chili. N. lat.  $38^{\circ} 30'$ .

TIRUAN, a town of Hindoostan, in Bundelcund; 20 miles N.E. of Callinger.

TIRUMBORE, a town of Hindoostan, in Madura; 7 miles N.E. of Madura.

TIRUN, or TEDONG, a name given to tribes who live chiefly on the N.E. coast of Borneo, and are reckoned a savage and piratical race, addicted to eating the flesh of their enemies. Their language is peculiar. It is probable,

however, that they are only a tribe of Idan, who are imagined to be only a race of Haraforas or Alfoërs, as they are termed by the Dutch, who seem to be the most original race of all the eastern islands, excepting perhaps the Papuas. The Idan are sometimes termed Marut; they are certainly the original inhabitants of Borneo, and resemble the Haraforas equally in stature, agility, colour, and manners. The Haraforas are indigenous in almost all the eastern isles, and are sometimes found on the same island with the Papuas or oriental negroes. They are often lighter in colour than the Mahometan races, and generally excel them in strength and activity. They are universally rude and unlettered, and where they have not been reduced to the state of slaves of the soil, their manners have a general resemblance. In their manners, the most singular feature is the necessity imposed on every person, of some time in his life embruing his hands in human blood; and, in general, among all their tribes, as well as the Idan, no person is permitted to marry, till he can shew the skull of a man whom he has slaughtered. They eat the flesh of their enemies, like the Battas, and drink out of their skulls; and the ornaments of their houses are human skulls and teeth, which are consequently in great request among them, as formerly in Sumatra, the ancient inhabitants of which are said to have originally had no other money than the skulls of their enemies. The Haraforas are found in all the Moluccas, in Celebes, the Philippines, and Magindano, where they are termed Subano or Manubo; and the ferocious race mentioned by Marsden, who live inland from Samanka in Sumatra, and are accustomed to atone their own faults by offering the heads of strangers to the chiefs of their villages, are probably of the same description. *As. Ref. vol. x.*

TIRUVELORE, a town of Hindoostan, in the Carnatic; 30 miles E. of Tanjore.

TIR-Y, or TYRIE, one of the islands of the Hebrides, situated in the district of Mull, and shire of Argyle, Scotland, is about 11 miles in length, and  $2\frac{1}{2}$  miles in breadth. Its coast is mostly rocky, and intersected with many beautiful fandy bays, some of them a mile broad. About one-half of the surface is arable, interspersed with small rocks and rising grounds, none of which are above 250 feet above the sea-level; but the surface in general is so even, that the waves are often seen from the one shore rising apparently several feet above the level of the other. In the centre of the island is a large plain, which contains about 1200 Scotch acres, and is elevated about six feet only above high-water mark: consequently, in stormy weather the sea often meets across this plain, and is productive of bad consequences. The inhabitants have endeavoured to avert this evil by building a defence of stone and earth on the one side, while the sea, on the other, has raised a considerable barrier of boulder stones; yet neither has been sufficient to resist the waves of the Atlantic. Here are several lakes, covering in all about 600 acres: in one of these is a small island, on which are the ruins of an ancient castle, on the site whereof a neat house has been erected for the residence of the factor of the duke of Argyle, who is proprietor of the whole island. The fisheries employ a number of hands, as well as the manufacture of kelp, of which about 245 tons are annually made. The hill of Cean-Mharra, the western point of the island, is remarkable for a great number of large natural caves, frequented by innumerable flocks of sea-fowls. Here are the remains of many Danish forts, and also of several old chapels, at some of which burying-grounds and crosses are still visible. In the time of St. Columba, this appears to have been part of the patrimony of

of that church. Here is a parochial school, and also one established by the Society for Promoting Christian Knowledge, both of which are well attended. The population of the parish (which comprehends the islands of Coll, Gunna, and Tir-y) was, in the year 1811, estimated at 3186. There is a regular ferry from Tir-y to Coll, three miles distant, which is often dangerous, owing to a heavy swell from the Atlantic, and a rapid current over rocks and shifting sands. The two islands appear to have been formerly united: the isle of Gunna, which lies in the sound, being apparently part of the intermediate land which has escaped destruction.—*Beauties of Scotland*, vol. v. *Carlisle's Topographical Dictionary of Scotland*, vol. ii.

**TIRYNS**, in *Ancient Geography*, a town of the Argolide, N. of Midea, situated in an enclosure of the mountains; called anciently Halicis, or the town of fishermen, from its having been the abode of the Hermionean fishermen. In the time of Paulanias it was in ruins.

**TISEUS**, or **TISEUM**, a very lofty mountain of Thessaly.

**TISALPHATA**, a town of Mesopotamia, situated W. of the Tigris, on one of the small rivers which discharged themselves into the Mygdonius.

**TISBURY**, in *Geography*, a small fishing town on the N. coast of Martha's Vineyard, belonging to the state of Massachusetts.

**TISCHNOWITZ**, a town of Moravia, in the circle of Brunn; 13 miles N.W. of Brunn.

**TISDRA**, **TUSDRO**, or *Thysdrus*, in *Ancient Geography*, a town of Africa, six leagues S.W. of Sarfura and five leagues S.W. of Achola. It has many ancient relics of altars, inscriptions, columns, and fragments of marble statues; and also the remains of an amphitheatre.

**TISEBARICA**, a country of Ethiopia, according to Arrian, which commenced near the port of Berenice, and extended along the Red sea, as far as the country of the Moschophagi.

**TISHEET**, in *Geography*, a town of Africa, with a salt-mine; 150 miles N. of Benown. N. lat. 17° 20'. W. long. 26° 50'.

**TISHOLTZ**, a town of Hungary; 10 miles E.N.E. of Libeten.

**TISIDIUM**, in *Ancient Geography*, a town of Africa, the command of which, according to Sallust, was given by Metellus to Jugurtha.

**TISIPHONE**, in *Mythology*, one of the three Furies. She is represented by the poets with vipers, sometimes as loose serpents, intermixed with her hair, and sometimes as serpents growing from her head instead of hair. As she is one of the chief of all the infernal executioners, her robe is described either as dropping with fresh blood, or stiff with human gore: this robe is fastened round her with a serpent instead of a girdle; and she has sometimes vipers twisted round her arms instead of bracelets. They sometimes give her a torch in her hand wet with blood; sometimes a torch in one hand and a serpent in the other; and sometimes serpents in both. Statius, *Theb.* i. v. 91. v. 111. v. 113. *Theb.* vii. v. 467. Ovid. *Met.* iv. v. 483. v. 490. v. 495. v. 510.

**TISMANA**, in *Geography*, a town of Walachia, at the source of a river of the same name; 18 miles W. of Tergosyl.—Also, a river of Walachia, which runs into the Syl, 15 miles S. of Tergosyl.

**TISQUIIU LAKE**, a lake of North America. N. lat. 56° 10'. W. long. 95° 45'.

**TISRI**, or **TIZRI**, in *Chronology*, the first Hebrew

month of the civil year, and the seventh of the ecclesiastical or sacred year.

The Hebrews call it *rajs-basbarna*, that is, the beginning of the year. It answered to part of our September and October. On the first day of this month was kept the feast of trumpets, because the beginning of the year was then proclaimed by sound of trumpets. On this day they refrained from all sorts of servile business, and offered in sacrifice a calf, a ram, and seven lambs. *Levit.* xxiii. 24. *Numb.* xxix. 1.

The tenth day of this month was the great day of expiation, and on the fifteenth the feast of Tabernacles began, which lasted till the twenty-second day inclusively. See *SCENOPEGIA*.

**TISSA**, in *Ancient Geography*, a small town of Sicily, at the northern foot of *Ætna*, near the river Onobala. *Ptol.*

**TISSANAH**, in *Geography*, a town of Hindoostan, in the circar of Sumbul; 16 miles S.W. of Sumbul.

**TISSIA**, a town of Bengal; 35 miles S.E. of Palamow.

**TISSUE**, **CELLULAR**, in *Anatomy*, the cellular substance. It is an expression borrowed from the *tissu cellulaire* of the French, who also often call it *tissu muqueux*. See *CELLULAR Substance*.

**TISTE**, in *Geography*, a post-town of Germany, in the county of Verden; 20 miles N.E. of Rotenburg.

**TISURUS**, **TOZER**, in *Ancient Geography*, a town of Africa Propria, S. of Adrametum, and 4 leagues S.W. of Tichafa. It has some Roman remains.

**TIT**, in *Geography*, a town of Morocco, near the Atlantic ocean; 8 miles S.W. of Mazagan.

**TIT**, in *Rural Economy*, a term provincially applied to a small stiff horse, or sort of poney, and sometimes to other horses, as a handsome or ugly tit, &c.

**TITALBARY**, in *Geography*, a town of Bengal; 20 miles N.N.W. of Goragot.

**TITALEEA**, a town of Bengal; 6 miles E. of Moorshedabad.

**TITALLYA**, a town of Bengal; 50 miles N. of Dinagepour.

**TITAN**. See *LEVANT*.

**TITANA**, in *Ancient Geography*, a town of Sicily, E. of the river Sitas, and W. of the river Afopus; situated on a mountain, and regarded as a fortified town. Here was a temple of Esculapius, and a statue of this god; and also a statue of Hygeia. In the temple of Esculapius were nourished sacred serpents.—Also, a small country of Sicily.—Also, a river of Asia, which had its source in mount Zagrus, and flowed into the river Sillas.

**TITANIA**, *τιτανια*, in *Antiquity*, a festival in memory of the Titans.

**TITANIDÆ**, or **ARTEMIDÆ**, the seven daughters of Chronus, son of Uranus, by Astarte.

**TITANIS**, in *Ancient Geography*, a port on the western coast of Corsica, between the mouth of the river Ticarius and the town of Fifera. *Ptol.*

**TITANIUM**, in *Mineralogy*, a metal originally discovered by Mr. Gregor of Cornwall, in the grains of a black mineral found in the bed of a rivulet in the valley of Menaian, in that county. It occurs also in different states of oxydation or intermixture in various parts of the world; and, according to the recent observations of M. Cordier, is a constituent part of most volcanic rocks. The oxyd of titanium is reduced by exposure to an intense heat, being previously moistened with oil and surrounded by powdered charcoal

# TITANIUM.

charcoal. A blackish blistered substance is obtained, which has a reddish colour in some points. According to Lampadius, its colour resembles that of copper, but is deeper, and the lustre is considerable. It is brittle, but when in thin plates, its elasticity is considerable.

When titanium is boiled with nitric acid, no remarkable effect ensues, but the bright spots disappear, and are succeeded by a white compound. Nitro-muriatic acid forms also a white powder, which remains suspended in it. Sulphuric acid exhibits a similar appearance, fulphurous acid is disengaged, and the titanium is partly changed to a white oxyd, and partly dissolved. Muriatic acid dissolves titanium, but not its oxyd.

The solution of titanium gives a white precipitate with alkaline carbonates, a grass-green mixed with brown with prussiate of potash, and a dirty dark green with the hydro-sulphurets. Infusion of galls precipitates a reddish-brown substance, which, if the solution be concentrated, has the appearance of blood. A rod of tin immersed in the solution imparts to the liquid round it a fine red colour, and a rod of zinc a deep blue.

Titanium tarnishes by exposure to the air, and is oxydized when heated in contact with it. It can exist in three states of oxydation; the first is blue or purple, the second red, and the third white. The white oxyd is the only one the composition of which is accurately known. It has been shewn by Vauquelin and Hecht to consist of eighty parts of red oxyd, and eleven of oxygen. Titanium has not yet been combined with sulphur, but has been combined by Mr. Chenevix with phosphorus.

The only alloy of any consequence which it forms is with iron; it is of a grey colour, interspersed with brilliant particles, and is quite infusible. The above are the principal properties of this metal which have yet been discovered: it has not hitherto been applied to any useful purpose in the arts.

The ores of titanium have been divided into six species by mineralogists; *viz.* menachanite, iserine, nigrine, sphene, rutile, and octahedrite.

*Menachanite* is so called from the valley of Menaian, in Cornwall, where it was originally found. It occurs also on the shores of the island of Providence, and in the vicinity of Richmond, in the United States of America; and also at Botany Bay, in New South Wales. It is found in small angular grains, which are of a greyish or iron-black colour, and have a rough glimmering surface. From its appearance it has been confounded with iron-sand, but its magnetic attraction is much weaker: it is less hard, and may be distinguished by its fracture, and particularly by the lustre, which approaches to semi-metallic. The fracture is imperfectly foliated: the fragments are angular and sharp-edged, and it is perfectly opaque. It yields to the knife, retaining its colour in the streak. It is opaque and brittle. The specific gravity, according to Gregor, is 4.427; but as given by Lampadius, is 4.270. Menachanite is infusible by the blowpipe without addition, but tinges borax of a greenish-brown colour. Its constituent parts, according to Klaproth, are

### *Cornwall.*

Oxyd of iron	-	-	51.00
Oxyd of titanium	-	-	45.25
Oxyd of manganese	-	-	0.25
Silex	-	-	3.50
			100

### *Botany Bay.*

According to Chenevix :

Oxyd of iron	-	-	49
Oxyd of titanium	-	-	40
Silex	-	-	11
			100

*Iserine* is so called from having been originally found near the source of the river Iser, in Silesia: it is disseminated in granitic sand, with iron-sand. It occurs also with similar sand in the bed of the river Don, in Aberdeenshire. It is suspected by professor Jameson to be associated with trap-rocks; and from the observations of M. Cordier, that it is found as a constituent part of lava, this opinion is rendered the more probable. Iserine is of a brownish iron-black colour. It is found in small grains and rolled pieces, with a rough and glimmering surface. The internal lustre is semi-metallic. Its fracture is conchoidal, which distinguishes it from menachanite, to which it bears a near resemblance. The specific gravity is 4.5. Before the blowpipe it melts into a blackish-brown coloured glass, which is slightly attracted by the magnet. The mineral acids have no sensible effect on it, but the acid of fugar extracts a portion of the titanium. According to Dr. Thompson, its constituent parts are

Oxyd of titanium	-	-	48
Oxyd of iron	-	-	48
Oxyd of uranium	-	-	4
			100

*Nigrine; Titane oxyde ferrifere* of Haüy, is so called on account of its colour, which inclines to a velvet-black. It occurs, like the preceding species, in angular grains and in rolled pieces. The external lustre is glistering, that of the fracture shining: the structure is imperfectly foliated. It is opaque, and harder than menachanite. Nigrine is brittle, and gives a yellowish streak. The specific gravity varies from 3.700 to 4.740. It is not attracted by the magnet, and is infusible by the blowpipe, but with the addition of borax melts to a transparent hyacinth red globule. The acid of fugar extracts the titanium from this ore. It is found in alluvial ground in Transylvania, Bavaria, and the island of Ceylon: it occurs also in the granite of the Uralian mountains.

The constituent parts of nigrine are given as under :

### *Transylvania.*

			<i>Klaproth.</i>
Oxyd of titanium	-	-	84
Oxyd of iron	-	-	14
Oxyd of manganese	-	-	2
			100

### *The Uralian Mountains.*

			<i>Lowitz.</i>
Oxyd of titanium	-	-	53
Oxyd of iron	-	-	47
			100

*Octahedrite; Schorl bleu*, Romé de Lisle; *Titane anatase*, Haüy. This ore of titanium is so called from its constant occurrence in crystallized forms, which are varieties of the

octahedron. The crystals are small; the surface is transversely striated, and has a semi-metallic lustre: the internal lustre is also splendid. The structure is foliated. This mineral is more or less semi-transparent; it scratches glass, and is brittle. The specific gravity, according to Häuy, is 3.8571. The colour of octahedrite is indigo-blue, passing through many shades to brown. It is infusible by the blowpipe, but with borax it forms a reddish-brown coloured glass. At the extremity of the flame, the brown colour changes to blue, and becomes opaque; by the continued action of the blowpipe, the brown colour reappears, and may be again changed by variation of temperature. This mineral is rare: it occurs in veins with felspar, axinite, rock-crystal, and chlorite, in the primitive rocks of Dauphiny, and in drusy cavities in limestone, at Hadeland, in Norway.

*Sphenz and Rutile.*—These ores of titanium have been already described. (See SPHENE and RUTILE.) In addition to those articles we may state, that common sphene has been discovered in small crystals in the sienite of the mountains in Galloway, and on the south side of Loch-Nefs; in the granite of Bennevis and Aberdeen; and also in other parts of Scotland. Rutile has also been discovered in the granite of Cairngorum, and near to Beddgelert, in Carnarvonshire.

TITANOS, a word used by some authors to express lime; by others for the calc of burnt gypsum or plaster of Paris, and by others a lixivium of quicklime.

TITANS, TITANES, ΤΙΤΑΝΕΣ, in the *Ancient Mythology*, the sons of Uranus or Cælus, and Vesta, or Titæa, or Terra, *i. e.* of Heaven and Earth, according to Hesiod and Apollodorus; or, which comes to the same thing, of Æther and Tellus, according to Hyginus. They are said to have derived their name from their mother, and hence the most ancient fabulous histories have made them pass for sons of the Earth. Apollodorus reckons six Titans; Oceanus, Cælus, Hyperion, Crius, Iapetus, and Saturn or Cronus: Hyginus also reckons six, *viz.* Briareus, Gyges, Sterope, Atlas, Hyperion, and Cottus; but he seems to include the hundred-handed giants in the number, which Apollodorus, and the generality of mythologists, distinguish from the Titans.

The tradition is, that Cælus, by the same wife Vesta, had Briareus, Gyges, and Cottus, the hundred-handed giants, and had chained them up in Tartarus: Vesta, the earth, their mother, resenting this treatment, raised the Titans against their father, her husband: all, excepting Oceanus, made war upon him and dethroned him, setting up Saturn in his place.

Saturn, it seems, proved no more favourable to them than his father; but continued the giants in their prison. Upon this, Jupiter revolted against Saturn; serving him as he had done Cælus; and rescued the three giants; who afterwards proved of great service to him in the war which the Titans waged against him.

This war lasted ten years: but at length the Titans were vanquished; Jupiter remained in peaceable possession of heaven; and the Titans were buried under huge mountains thrown on their heads.

Hyginus gives another origin of the Titans: he derives them from Titan, Saturn's eldest brother, by Cælus and Vesta; who, though presumptive heir of heaven, yet finding his father and mother more inclined for Saturn than for him, surrendered to him his right of succession, on condition he should not bring up any male child, that the empire of heaven might revert to his own issue the Titans.

But Jupiter, Neptune, and Pluto, having been afterwards saved by the artifice of Ops, Titan, and his sons the Titans,

made war on Saturn, who had dispossessed his father Uranus of the throne, and acquired an extensive empire, vanquished and imprisoned him; thus he continued in the power of his enemies, till Jupiter, who had been conveyed by his mother Rhea for safety to the isle of Crete, being grown up, left Crete, made war on the Titans, and delivered his father.

Having re-established him on the throne, he returned to the place of his retreat. Saturn afterwards reigned for some time in tranquillity; but upon consulting an oracle, he received information that he would be exposed to danger from the youngest of his sons. Accordingly he recurred to all possible means for getting aid of Jupiter. Having sought him in Crete, he was betrayed and constrained to make a hasty retreat into the Peloponnesus. Thither Jupiter pursued him, and obliged him to take sanctuary in Italy, under the protection of Janus.

The Titans, thus dispersed through several countries of Greece, being jealous of the power of this new conqueror, as they had been of his father's, levied troops against Saturn, and gave him battle; but being defeated, they retired into the interior parts of Spain, whither Saturn followed them. Jupiter sought them out in their retreat, and beat them for the last time near Tartessus, and with this battle terminated the war, which had lasted ten years. Saturn made his escape into Sicily, and there, as it is said, died from grief. With this last victory, and the death of Saturn, commenced the reign of Jupiter. During the war of the Titans, Atlas seized on those provinces of Africa which were remote from the centre of the empire. Pluto was settled governor of the western parts of the empire of the Titans, of the Gauls, and Spain, which government, after the death of Pluto, was given to Mercury, who is said to have become the great divinity of the Cæta; and Jupiter reserved to himself the whole East, that is, Greece, the Isles, and that part of Asia whence his ancestors came. For the explication of the fable that represents the Titans as thrust down to Tartarus by Saturn, see TARTARUS.

The most judicious among our mythologists, such as Gerard Vossius, Marsham, Bochart, and father Thomassin, are of opinion that the partition of the world among the sons of Noah, Shem, Ham, and Japhet, was the original of the tradition of the same partition among Jupiter, Neptune, and Pluto; and hence they have been led to form comparisons between the three fabulous princes, and the three sons of the patriarch. Accordingly the learned Pezron contends that the division which was made of this vast empire, came in after-times to be taken for the partition of the world: that Asia remaining in the hands of Jupiter, the most potent of the three brothers, made him be looked upon as the god of Olympus, a celebrated mountain where he had his residence, and which was afterwards taken for heaven itself: that the sea and islands which fell to Neptune, occasioned their giving him the title of god of the sea: and that Spain, the extremity of the then known world, thought to be a very low country in respect of Asia, and famous for its excellent mines of gold and silver, falling to Pluto, occasioned him to be taken for the god of the infernal regions. However this be, the empire of the Titans, according to the ancients, was very extensive. These princes were possessed of Phrygia, Thrace, a part of Greece, the island of Crete, and several other provinces, to the inmost recesses of Spain. To these Sanchoniathon seems to join Syria; and Diodorus adds a part of Africa and the kingdoms of Mauritania.

F. Pezron, in his *Antiquity of the Cæta*, makes that people to be the same with the Titans; and their princes the same with the giants in Scripture. According to him,

the Titans were the descendants of Gomer, the son of Japhet. He adds, that the word Titan is perfect Celtic, and derives it from *tit*, earth, and *den* or *ten*, man: and hence it was the Greeks also called them very properly *γηνευστις*, *q. d. terrigenæ, earth-born*.

Banier observes, that although most of the ancients have confounded the giants (see *Rebel GIANTS*) with the Titans, they ought to be distinguished. The latter, he says, were of an illustrious family, and extended their empire over one part of the world; the others were so many banditti dispersed over Thessaly, who occasioned great trouble to the Titans. Hesiod distinguishes them from one another, and states that the giants were not born till long after the overthrow of the Titans, and after the wars which these carried on against the others. The occasion of confounding them seems to have been, that both the giants and the Titans made war upon the gods; with this difference, that the Titans, though of the same race, had often separate interests; some taking part with Saturn, and others of them with Jupiter: whereas the giants were a gang of robbers, who had a design equally upon all the Titans. Both giants and Titans were represented as sons of Heaven and Earth, and hence they have been confounded, for want of considering, what Apollodorus says, that Earth brought forth the giants only because she was incensed against Jupiter for keeping the Titans shut up in Tartarus. Thus the Titans were born long before the giants.

The Titans, according to the learned Mr. Bryant, were those Cuthites, or sons of Chus, called *giants*, who were employed in building the tower of Babel, and who were afterwards dispersed. See *DISPERSION of Mankind*.

He supposes that they were denominated from their religion and place of worship, *Titæa*, which is represented as the mother of these people, being compounded of *Tit-aiæ*, and signifying literally *a breast of earth*, analogous to *τιθος αις*; of the Greeks, and therefore expressing the figure as well as the materials of the ancient altars, which consisted of a conical hill of earth, in the shape of a woman's breast. These altars were also called *Tit-an* and *Tit-anis*, from the great fountain of light, styled *An* and *Anis*. Hence many places were called *Titanis* and *Titana*, where the worship of the sun prevailed; for *Anes* and *Hanes* signified the *fountain of light* or *fire*. Titana was sometimes expressed Tithena, and by the Ionians Tithena; and Tithena was said to be the nurse of the Titans. But Titæa their mother, and Tithena their nurse, were all of the same nature, *viz.* altars raised of soil. Hesiod, in his account of the dispersion of the Titans, and of the feuds which preceded (*Theogon. ver. 676, &c.*), says that the Deity at last interposed, and put the Titans to flight, and condemned them to reside in Tartarus at the extremities of the earth; but Mr. Bryant observes, that he has confounded the history by supposing the giants and Titans to have been different persons. The sons of Chus, he says, were the aggressors in those acts of rebellion described by the poets as the war of the giants, who were also represented under the character of the Titanians. The fictions of the poets with regard to the banishment of the Titans after their war against heaven, took their rise from this true history. A large body of Titanians, after the dispersion, settled in Mauritania, upon the Atlantic ocean, which is the region styled Tartarus, and represented as the realms of night, because it was situated in respect to Greece towards the regions of the setting sun. The term *ζοφος*, by which it was expressed, signified both the west and darkness; as did also Ereb, ערב, whence Erebus, which was also another name for Tartarus, to which the poets condemned the Titans and giants. The first war of the Titans, accord-

ing to this ingenious writer, consisted in acts of apostacy and rebellion against heaven: and this refers to that part of the history of the sons of Chus, which represents them as building a mighty city in the region, which they had usurped, and erecting a lofty tower, to prevent their being scattered abroad: but there was another war in which they were engaged with men, which happened in consequence of the dispersion. This was no other than the war mentioned by Moses, which was carried on by four kings of the family of Shem, against the sons of Ham and Chus, to avenge themselves of these enemies by whom they had been greatly aggrieved. See Bryant's *Analysis of Ancient Mythology*, vol. iii. p. 48, &c. p. 71, &c.

The word Titan is also used by the poets for the sun; in which case it is likewise Celtic, though from another root, being formed from *ti*, house or habitation, and *tan*, fire.

Hesychius observes, that Titan is likewise used for Iodomite. He adds, that it is also one of the names of antichrist; in which sense it must be written *Teitan*, in Greek, to contain the numeral letters of 666, which in the Apocalypse, xiii. 18. is the number of the beast.

TITANUS, in *Ancient Geography*, a town of Asia Minor, on the coast of the Æolide, on the banks of a river of the same name.

TITARESSUS, a town of Asia, in Lesser Armenia, in the country named Melitane. Ptol.

TITAREBUS, or TITARESSUS, a river of Thessaly, mentioned by Homer, which had its source in mount Titarus.

TITATY, in *Geography*, a town of Bengal; 55 miles N. of Dinagepour.

TITCHFIELD, a small market-town in the hundred of the same name, in the Portsdown division of the county of Hants, England; is situated near the Titchfield river, 3 miles W. from Fareham, and 78 miles S.W. from London. It is inhabited by many respectable families. The church, which is the only object of particular notice, is a spacious edifice, of the workmanship of different ages: the N. side is said to have been built by William of Wykeham; but the S. side is more ancient. In the S. chancel is an interesting monument to the memory of sir Thomas Wriothesley, first earl of Southampton, Jane his lady, and Henry their son, the second earl; all of whom are represented by effigies on the tomb. Four annual fairs are held in Titchfield; and a weekly market on Saturdays. The population of the parish, under the act of 1811, was returned as 3227, the number of houses at 553.

At a short distance from the town, on the N., are the ruins of Titchfield House, the ancient seat of the Wriothesleys. It was erected, by the first earl of Southampton, on the scite, and with the materials of an abbey, founded for Premonstratensian canons, by bishop Peter de Rupibus, in the year 1231. The annual revenues of this establishment, at the period of the dissolution, amounted, according to Dugdale, to 246*l.* 16*s.* 1*d.*; but according to Speed, to 280*l.* 19*s.* 4½*d.* Its possessions were then granted by Henry VIII. to his favourite secretary, Wriothesley, who built here, Leland reports, "a righte statelie house embattled, and having a goodlie gate, and a conducte castellid in the middle of the court of it, in the very same place wher the late monasterie floode." This building is now in a very dilapidated state: the entrance gateway is the principal part left standing; sixteen rooms having been recently pulled down for the sake of the materials. The estate is the property of John Delmé, esq. of Cam's Hall. In Titchfield House, Charles I. was concealed after his escape from Hampton Court in 1647, and previous to his resigning himself to colonel Hammond,

who conducted him to the Isle of Wight.—*Beauties of England and Wales*, vol. vi. Hampshire; by J. Britton and E. W. Brayley.

**TITCHVIN**, a town of Russia, in the government of Novgorod, on the river Sias; 84 miles N.N.E. of Novgorod. N. lat.  $59^{\circ} 52'$ . E. long.  $33^{\circ} 14'$ .

**TITE**. See **TIGHT**.

**TITEA**, in *Mythology*, the wife of Uranus or Cœlus, by whom he is said to have had eighteen children, each of which had his own name, though they were generally designated by the appellation of *Titans*; which see. This princess, after her death, received divine honours, and she was called after her name.

**TITERUD**, in *Geography*, a town of Norway, in the province of Aggerhuus; 38 miles N. of Christiana.

**TITHENIDIA**, τῆθενιδία, in *Antiquity*, a Spartan festival, so called from τῆθεναι, *nurses*, who at this time carried the male infants committed to their charge to the temple of Diana Corythallia. For the ceremonies observed on this occasion, see Potter, *Archæol. Græc. lib. ii. cap. 20. tom. i. p. 422, seq.*

**TITHES**, **TYTHES**, *Tenths*, *Decimæ*, or *Diximes*, the tenth part of the increase, yearly arising and renewing from the profits of lands, the stock upon lands, and the personal industry of the inhabitants; allotted to the clergy for their maintenance.

Tithes essentially differ from *offerings*, *oblations*, and *obventions*, which are the customary payments for communicants at Easter, for marriages, christenings, churching of women, burials, and such like. See **OBLATIONS**.

Tithes, with regard to their several kinds or natures, are *personal*, *predial*, and *mixt*.

**TITHES**, *Personal*, are those due or accruing from the profits of labour, art, trade, navigation, and industry of men; and of these, only the tenth part of the clear gains and profits is due; after charges deducted.

**TITHES**, *Predial*, are those which arise merely and immediately from the ground; as grain of all sorts, hay, wood, fruits, herbs; for a piece of land or ground, being called in Latin *prædium* (whether it be arable, meadow, or pasture), the fruit or produce of it is called *predial*.

**TITHES**, *Mixt*, are those which arise not immediately from the ground, but from things immediately nourished by the ground, as from beasts, and other animals fed with the fruits of the earth; as colts, calves, lambs, chickens, milk, cheese, eggs.

Tithes, with regard to their value, are divided into *great* and *small*.

**TITHES**, *Great*, are those of corn, hay, and wood.

**TITHES**, *Small*, are the *predial* tithes of other kinds, together with those that are called *mixt* and *personal*. It is said, that this division may be altered by custom, which will make wood a small tithe in the endowment of the vicar; by quantity, which will convert a small tithe into great, if the parish is generally cultivated with it; and by change of place, which makes the same things, *e. g.* hops in gardens, small tithes, in fields great tithes. But it has been admitted, that the quantity of land within any parish, that is cultivated for a particular produce, cannot change the nature of the tithe: and, according to this opinion, the law is now settled, that the tithes are to be denominated *great* or *small*, according to the nature and quality of them, and not according to the quantity.

It has been said by lord Coke and many others, that before the council of Lateran in the year 1180, a man might have given his tithes to what church or monastery he pleased; but this is denied by Dr. Prideaux. It is now certain, that

tithes of common right do belong to that church, within the precincts of whose parish they arise; and this regulation, corresponding with the ancient law of the land, was enjoined by a decretal epistle of Innocent III. to the archbishop of Canterbury, in the year 1200. (2 Inst. 641. 2 Blackst. Com. 27.) But though one person may prescribe to have tithes within the parish of another; this is what is called a "portion of tithes." (Gibf. 663.) Tithes extra-parochial, or within the compass of no certain parish, belong to the crown, and may be granted to whom the king will. 1 Roll's Abr. 657. 2 Inst. 647.

It is a general rule, that of common right tithes are to be paid for every thing that yields an annual increase; but this rule admits of exceptions, *e. g.* tithe is due from saffron, though gathered but once in three years; and on wood that is felled or lopped, called *sylva cadua*, though it is not renewed every year: and on the other hand, tithes shall be paid for the produce of seeds, as of clover, sown on the same ground, though renewed oftener than once a year. No tithes shall be paid of common right for any thing that is of the substance of the earth, or which is not of annual increase, as stone, lime, coal, tin, lead, and such like; nor for creatures that are *feræ naturæ*, or of a wild nature, as deer, hawks, fish, &c. whose increase so as to profit the owner is not annual, but casual; unless tithes in either of these cases are payable by custom. Degge, p. 2. c. 8. 1 Inst. 651. 664.

Lands, and their occupiers, may be exempted or discharged from the payment of tithes, either in part or totally, by a real composition, or by custom and prescription.

A *real* composition is when an agreement is made between the owner of the lands, and the parson or vicar, with the consent of the ordinary or patron, that such lands shall for the future be discharged from payment of tithes, by reason of some land, or other real recompence given to the parson, in lieu and satisfaction thereof. But these compositions are now restrained by the disabling statute 13 Eliz. cap. 10. See **COMPOSITION**.

A parson may bind himself by *deed* to accept of a composition for tithes during life, or incumbency of a particular living. It is also very common to agree by *parol* for an annual composition for tithes, which binds the parties to it till sufficient notice given of dissent from the agreement, but what is sufficient notice to determine such an agreement, has never been decided in terms. See **LEASES by Statute**.

A discharge by custom or prescription is, where time out of mind such persons, or such lands, have been either partially or totally discharged from the payment of tithes. The difference between *custom* and *prescription* is this: *Custom* is that which gives right to a province, county, hundred, city, or town, and is common to all within the respective limits; in pleading of which it is alleged, that in such a county or the like, there is, and time out of memory hath been, such a custom used and approved therein. *Prescription* is that which gives a right to some particular house, farm, or other thing; in pleading of which it is alleged, that all they whose estate is had in such land, have time out of mind paid so much yearly, or the like, in full satisfaction of all tithes arising on those lands. (Gibson, 674.) And there is this difference between a prescriptive and customary modus, that the former is annexed to the lands which it covers, whereas the latter exists in action of law, independent of the lands by force of the custom of the district. In a prescriptive modus, therefore, the lands must be definite, and not liable to shift. And therefore a bill to establish a modus for every ancient farm, but not setting out the abutments of each, was dismissed,

## TITHES.

dismissed, although it was stated that the whole parish consisted of ancient farms. (See CUSTOM and PRESCRIPTION.) This custom, or prescription, is either *de modo decimandi*, (see *Modus Decimandi*;) or *de non decimando*. No modus can be established at this day, but by act of parliament. A modus founded upon good considerations may be in various ways discharged, and tithes become due in kind: as,

1. Where land is converted to other uses: so, when the prescription is for hay and grafs, specially, in so many acres of land; if the land is converted into a hop-garden or tillage, the prescription is gone.

2. By the alteration or destruction of the thing for which the money was paid: as where two fulling-mills were under the same roof, and turned into a corn-mill; where also there was one pair of stones in a mill, and another pair was added; and where the water-course was altered by the owner, and the mill was pulled down and re-edified upon it; in all these cases, it was adjudged that the modus was gone. But where a man was seised of eight acres of meadow and one of pasture, for the tithes whereof he had paid time out of mind *5s. 4d.* and afterwards the owner built a corn-mill upon the same; it was adjudged that he should pay no tithes for the corn-mill, because the land was discharged by the modus. 2 Inst. 490.

3. By non-payment of the consideration, or payment of tithes in kind, for so long a time as to destroy the possibility of making proof that such custom or prescription was: but an interruption for some short time only, will not discharge it; especially if made by the lessee, to the prejudice of the lessor. Watf. c. 47.

The rule is, that the modus is to be sued for in the ecclesiastical court, as well as the very tithe; and if it be allowed between the parties, they shall proceed there; but if the custom be denied, it must be tried at the common law: and if it be found for the custom, then a consultation must go; otherwise the prohibition standeth. The like is affirmed, in case a jury upon an issue joined in a prohibition upon a modus decimandi, find a different modus; since a modus is found, they shall not have consultation. 2 Inst. 490.

The principal reason why the courts of common law prohibit the spiritual court from trying of moduses, is, that whereas every modus is less than the real value, the rule of the canon law is, that less than the real value shall not be taken, and that a custom to the contrary is void; and that the ecclesiastical and temporal laws differ in the times of limitation, forty years or under making a good custom by the ecclesiastical laws, whereas by the temporal laws it must be beyond the time of memory. Gibf. 691.

But the spiritual courts have commonly allowed and do allow pleas of modus decimandi; and the averment in the prohibition is not that they do take cognizance, but that the plea hath been offered and refused; which supposeth, that if the plea be admitted, the prohibition ought not to go. And accordingly it hath been affirmed by Doderidge and others, that the spiritual court may as well try the modus, as the right of tithes, and that a prohibition is not to be granted, till the spiritual court either refuse to admit the plea, or proceed to try it by methods different from the rules of the temporal law, as to the time of limitation, or number of witnesses, or the like. And where lord Coke contended for the contrary doctrine, it was declared by Kelynge and Twisden, that in case one libel for a modus decimandi, if the spiritual court allow the plea, they may try it. Gibf. 691.

But, notwithstanding, it seemeth now to be clearly settled, that if a modus decimandi be sued for in the ecclesiastical court, a prohibition lies to stop the trial of it, if the

modus be denied; and the reason is not upon the account that the spiritual court wants jurisdiction, but in regard of the notion the temporal law hath of custom, different from the spiritual: and seeing that every modus is due by custom, it is the common law only that can determine, what time and usage with us shall be sufficient to create such custom, that is, time beyond all memory to the contrary. Whereas by the spiritual law, sometimes ten years, sometimes twenty, they will adjudge sufficient to create a custom. And prohibitions in such cases are granted, not because the spiritual court hath not jurisdiction of the matter, but in respect of the trial which is to be by the temporal law only; and if upon the trial it be found for the modus, the proceedings shall go on in the spiritual court; if against the modus, the prohibition shall stand. Watf. c. 56.

If in the trial of a modus, the defendant permits the spiritual court to proceed to sentence, he is then too late to come for a prohibition; because it is only for defect of trial, and not for defect of jurisdiction: but a man is never too late for a prohibition, where it is for defect of jurisdiction. Bunb. 17. 10 East's Rep. 349.

A bill in equity, in the nature of a bill of peace, will also lie to establish a modus, where a suit has been instituted for tithes in kind; but a bill to establish a modus or customary payment in lieu of tithes, cannot be supported, where there has been no attempt to enforce the payment of tithes in kind. 4 Gwill. 1596.

The following moduses have been established as good, by decisions in the courts of law: One penny for ancient gardens and orchards. (Bunb. 79.) Seventeen-pence for every cow having a calf, for the tithe of the milk and calf; eleven-pence for the tithe of the milk of a milk cow, milked without a calf; for every heifer, the first year she has a calf, thirteen-pence for the milk and calf—these payable at Michaelmas. Eight-pence for every hoghead of cyder, made of apples grown in the parish; for hoard apples, one penny; for fire-wood spent on the farm, one hearth penny; for fruit, herbs, roots, and other garden stuff, a garden penny; for a colt, one penny;—these payable at Easter. (Bunb. 57.) Eight-pence for a cow, four-pence for an heifer; three shillings and four-pence, payable at Easter, for every score of sheep shorn out of the parish, and so proportionably for a less number than twenty, or for a less time than a year, for their wool and lambs. (Bunb. 171.) Two-pence an hog-head for cyder. (Roll. Abr. 649.) The non-resident occupiers of land in B. and W. to pay on Good Friday, or as soon after as demanded, four-pence an acre for the tithe of hay, and the herbage of pasture lands not ploughed or sown; but, if resident, to pay tithes in kind. (2 P. Wms. 565.) Four-pence an acre for high land, and three-pence an acre for low land. (Ibid.) Twelve-pence for an acre of low meadow, and eight-pence for an acre of high meadow, for tithe of hay. (1 Bro. P. C. 214.) One penny for hay for an ancient messuage, with the demesne lands thereunto belonging, containing 60 acres, &c. One pound six shillings and eight-pence for an ancient tenement, containing 625 acres, for hay, small tithes, and Easter offerings. (Bunb. 161.) Nine cart-loads of logwood, delivered to the rector by the lord of the manor, for himself and tenants, in lieu of all tithes. (Bunb. 279.) So of six pounds *per annum*. (Cro. Eliz. 559.) A halfpenny for each calf, in lieu of calves, payable on Wednesday before Easter. A smook penny for fire-wood. An halfpenny, payable on Shear-day, for the wool of each sheep dying between Candlemas and Shear-day. Four-pence a month, payable on Shear-day, for the tithe wool of every hundred sheep shorn in the parish, which were brought in after the 2d day of February.

Three

## TITHES.

Three eggs for every cock and hen, duck and drake, payable on Wednesday before Easter, in lieu of tithe eggs, and chickens and ducks hatched in the parish. (Bunb. 307.) Thirty eggs for all tithes of eggs. (1 Roll's Abr. 648. 651. 2 Salk. 656.) The tenth cheefe made from the 1st of May until the last of August, in discharge of the tithe of milk. (Cro. Eliz. 609.) An halfpenny for the wool of sheep fold after shearing, and before Michaelmas. (Moore, 911.) One penny *per* head for sheep brought into the parish after Candlemas, and cleft in the parish, in lieu of tithe of wool; three-pence *per* head for sheep in the parish before Candlemas, and carried out before shearing time, though the wool tithe is not then actually due. (1 Anst. 341.) It is a good modus for an innkeeper, that in consideration that he and all, &c. have paid tithe hay and grain growing upon the land belonging to the said inn, and have paid tithe for all their own cattle feeding upon the land, that they have been time, &c. discharged of the tithes of the horses of their guests agisted in the said land, when they travel by the said inn; for some have said that this was but a personal tithe, and others have said that no tithes should be paid for such *agistment* by the common law, without any modus. 9 Vin. Ab. 13.

The things that are titheable are, for the most part, as follow: corn is a predial great tithe, and titheable according to the custom of the place, commonly by the tenth shock, cock, or sheaf. Beans and pease, expended in the house, are subject to no tithes; but if they are gathered to be sold, or to feed hogs, they are titheable, and are in their nature great tithes. Hay is a predial great tithe, and is to be tithed in swathes or cocks, according to the custom of the place. Clover, rape, and woad, are small tithes; heath, furze, and broom are also titheable: but no tithe shall be paid of fern. (2 Inst. 652.) The tithe *agistment* is a small tithe, and due of common right. Wood is a predial tithe, but whether great or small, hath been questioned between the parsons and the vicars; but it has been resolved, that if a vicar be only endowed with the small tithes, and has always had tithe-wood, in such case it shall be accounted a small tithe, otherwise it is to be accounted among the great tithes. Timber fit for building of houses and ships, and comprehending oak, elm, and ash, are exempted from tithes, by 45 Edw. III. c. 3; but timber-trees, cut and corded for fuel, have been adjudged to pay tithes, as well as under-wood; however, no tithe shall be paid for the roots of trees, for wood cut for husbandry or fuel, for hurdles of sheep, for hop-poles, and for making of bricks, and also fruit-trees. When the wood is titheable, it is set out while standing by the tenth acre, pole, or perch; or, when cut down, by the tenth faggot or billet. Of under-woods fold standing, the tithe shall be paid, not by the seller, but by the buyer. The tithe of flax and hemp is a small tithe, and by statute this is charged at 5s. *per* acre. (11 & 12 Will. c. 16.) The tithe of madder is also a small tithe, and charged at 5s. *per* acre, by 31 Geo. II. c. 12. The tithe of hops is predial, and reckoned among small tithes; it is not to be paid till after they are picked, and before they are dried, every tenth measure. Out of gardens is paid tithe of all garden herbs and plants, which are small tithes, and may be demanded in kind: potatoes and turnips are also small tithes, as are likewise tobacco and saffron. However, in lieu of the tithes of gardens, a certain consideration in money is paid, either by custom, or by agreement with the parson. Fruits of trees, as apples, pears, plums, cherries, and the like, are predial tithes, to be paid in kind when they are gathered, unless there is some modus, or rate-tithe, paid in lieu of them. The tenth calf is due to the parson of common right; and if there are seven, he

shall have one; if under seven, a halfpenny, or what custom shall direct, for each calf. But in most places, at this day, the custom hath obtained, that if there are five, the parson shall have the value of half a calf, lamb, or other such like; if there are six, he shall have one entire; and shall receive or pay out respectively a proportionable sum for each number under five, or above six. Colts and pigs are titheable in the same manner as calves; and the time of payment of these tithes is when they are so old that they may be weaned. Wool and lamb are generally reckoned mixt small tithes. Milk is a mixt tithe: where tithe-milk is paid in kind, no tithe-cheefe is due; and where tithe-cheefe is paid in kind, no tithe-milk is due. The tithe of milk is to be paid, not by the tenth part of every meal, but by every tenth meal entire. Deer and conies, being *feræ naturæ*, are not titheable of common right, but by special custom. Of fowls, which are domestic, as geese, hens, and ducks, tithes are to be paid, either by paying the tenth egg, or the tenth of their young, according to custom. It hath been adjudged, that the paying of thirty eggs in Lent, is a good modus for all tithes of eggs. Bees are free of tithes, but the wax and honey are chargeable at the rate of the tenth measure of honey, and the tenth weight of wax. By the books of common law it appears, that some tithe or other is due for a mill. Fish in ponds and private fisheries, and in common rivers, are titheable only by custom. Fish taken in the sea are chargeable by custom as a personal tithe. Personal tithes are regulated by stat. 2 & 3 Edw. VI. c. 13; but personal tithes are now scarcely any where paid in England, unless for mills or fish caught in the sea, and then payable where the party hears divine service, and receives the sacrament.

The manner or form of setting out or payment of tithes, is for the most part governed by the custom of the place. The parson, vicar, impropriator, or farmer, cannot come himself, and set forth his tithes, without the licence and consent of the owner; for if of his own head he shall tithe the corn or hay of any land-holder within his parish, and carry it away, he is a trespasser, and an action will lie against him for it. But every person is bound of common right, to cut down, and set out the tithes of his own lands. And that it may be done faithfully and without fraud, the laws of the church entitle the parson to have notice given him; but by the declaration of the common law, such notice is not necessary. Yet nevertheless, the common law declareth a custom of tithing without view to be an absurd custom: and by the statute of 2 & 3 Ed. VI. c. 13. it is enacted, that at all times whensoever, and as often as any predial tithes shall be due at the tithing of the same, it shall be lawful to every party to whom any of the said tithes ought to be paid, or his deputy or servant, to view and see their said tithes to be justly and truly set forth and severed from the nine parts.

The care of the tithes, as to waste or spoiling, after severance, rests upon the parson, and not upon the owner of the land. For it seemeth that the parson is at his peril to take notice of the tithes being set out; and so it hath been declared, that although the parishioner ought *de jure* to reap the corn, yet he is not bound to guard the tithes of the parson. Gibb. 689.

But after the tithes are set forth, he may of common right come himself, or his servants, and spread abroad, dry and stack his corn, hay, or the like, in any convenient place or places upon the ground where the same grew, till it be sufficiently weathered and fit to be carried into the barn. But he must not take a longer time for the doing thereof, than what is convenient and necessary; and what shall be deemed a convenient and necessary time, the law doth not nor can define; for the quantity of the corn or hay, and the weather,

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rier, in this case are to be considered; and what shall in this and all other cases of like nature be said to be a reasonable and convenient time, is to be determined by the jury, if the point come in issue triable by a jury; but if it come to be determined upon a demurrer, or other matter of law, the judges of the court where the cause depends are to resolve the same. Deg. p. 2. c. 14. Str. 245.

And it shall be lawful quietly to take and carry the same away. And if any person carry away his corn or hay, or his other predial tithes, before the tithe thereof be set forth; or willingly withdraw his tithes of the same, or of such other things whereof predial tithes ought to be paid; and if any person do stop or let the parson, vicar, proprietor, owner, or other their deputies or farmers, to view, take, and carry away their tithes, as is above said; he shall forfeit double value, with costs; to be recovered in the ecclesiastical court. 2 & 3 Ed. VI. c. 13.

And he may carry his tithes from the ground where they grew, either by the common way, or any such way as the owner of the land useth to carry away his nine parts. But if there are more ways than one, and the question is, which is the right way, this is cognizable in the temporal court. Deg. p. 2. c. 14.

It seems, that if tithes set forth remain too long upon the land, the owner of the soil may take them damage feasant; but then, if he be sued for them, in order to justify, he must set forth how long they had remained before he took them; and when they shall be said to remain too long is triable by the jury. Watf. c. 54.

Or an action upon the case will lie against the parson for his negligence in this behalf: but no action in such case will lie, unless the parishioner hath duly set forth his tithes, and hath also given notice to the parson, that they are so set forth. Deg. p. 2. c. 14. L. Raym. 187.

But the occupier of the ground cannot put in his cattle and destroy the corn or other tithe: for that is to make himself a judge, what shall be deemed a convenient time for taking it away: but the court and jury, upon an action brought, are to determine of the reasonableness of the time, and of the recompence to be made for the injury sustained. L. Raym. 189.

Tithes are recoverable in the spiritual court by the canon law, and by divers statutes, as the statute of *circumspexere agatis*, 13 Edw. I. st. 4; the statute of *articuli clerici*, 9 Edw. II. st. 1. c. 1. 18 Edw. III. st. 3. c. 7. 1 Rich II. c. 13, 14. 27 Hen. VIII. cap. 20. 32 Hen. VIII. c. 7. 2 & 3 Edw. VI. c. 13. 7 & 8 Will. III. c. 6. 34. 1 Geo. st. 2. c. 6. 27 Geo. II. c. 20.

Tithes in London are subject to particular regulations. By a decree made in 1545, according to the statute 37 Hen. VIII. c. 12. it is ordered, that the citizens and inhabitants of London and its liberties, shall yearly pay their tithes to the parsons, vicars, and curates, after the rate of  $6\frac{1}{2}d.$  for every 10s. annual rent, and 2s. 9d. for every 20s. rent, and so above the rent of 20s. by the year, ascending from 10s. to 100s., according to the said rate. The wife, children, servants, or others of their family, taking the rites of the church at Easter, shall pay 2d. for their four offering days yearly, &c. Notwithstanding the settlement of this decree, divers prescriptions for the payment of lesser rates than the parsons might require by it (as to pay 10s. for the tithe of a house, although its rent was 40l. a year, or more) have been gained and allowed. But by 22 & 23 Ch. II. c. 15. after the fire of London, annual certain tithes, or sums of money in lieu of tithes, for fifty-one churches, were appointed to be raised by assessments, in the manner prescribed by the said act. For the stipends of the ministers of

the fifty new churches, provision is made by the several acts of parliament relating to them, to be raised from the duties on coals. There are also particular statutes for particular churches, in London and in other places.

*Original and History of Tithes.*—The custom of giving or paying tithe is very ancient; in Gen. xiv. 20. Abraham gives Melchisedech the tenth of all the spoils he had taken from the four kings he had defeated: in Gen. xxviii. 22. Jacob makes a vow at Bethel, to give the tenth of all the riches he shall gather in that sojourn, to God.

But these tithes were free and voluntary, and, besides, differed in divers other respects from what was afterwards called tithe: what Melchisedech received, was only the tenth of the spoils, not of Abraham's possessions; and this once, not annually; and beside, not as maintenance, which Melchisedech wanted not, but as homage; add, that this was only from one priest to another; for Abraham had not only a priest in his loins, but was a priest himself. And as to Jacob, who was also a priest, what he did was the effect of a vow, voluntarily taken, to offer the tenth of all he should possess; not to any other priest, but to God himself upon an altar.

Tithe was first legally enjoined by Moses, Lev. xxvii. 30. Numb. xviii. 21. Deut. xiv. 22. That legislator obliged the Israelites to the payment of several kinds of tithes: as,

1. The *first tithe* מעשר הראשון, which was a tithe of all the fruits given to the Levites: this was not taken till after the oblation called תרומה *terumah*, which was a tenth part allotted to the priests, had been made.

2. The *second tithe* was a tenth part of the nine remaining, after payment of the first tithe. This tithe was set apart in each family, and the master of the family was obliged to carry it to Jerusalem, and to use it there; or, in case he could not, he was to redeem it, or convert it into money: in which case he was to add a fifth to it, and carry the money to Jerusalem.

3. The *tithe of the tithe*, was the tenth part of all the tithes that had been given to the Levites by the people: for the Levites, after they had got all their tithes of the people, divided the whole into ten parts; and in their turn gave a tithe to the priests.

4. The *tithe of the third year* was another kind of tithe, not much different from the second tithe, excepting that it was less troublesome; because they did not carry it to Jerusalem either in kind, or in money, but kept it by them, to be spent by the Levites, the strangers, the fatherless, and the widows of the place, Deut. xiv. 28, 29. This was also called the *tithe of the poor*, and the *third tithe*; and these third years when it was paid, were called the *tithe-years*. Several learned Jews and Christians, however, conceived that this was not a distinct tithe, but the same as the second; so that, as Mr. Mede apprehends, what was wont in other years to be spent in feasting, was every third year spent upon the poor. All these tithes are calculated to amount to above one-sixth of the revenue of each person.

These matters are all farther explained in the Talmud, in which are two books on tithes; also in the book of benedictions, ברכין, in the commentaries of Bartenora, Maimonides, R. Schelomoh Jarrhi, in Scaliger, Amama, Selden, Frischmuth, Quensted, Varenius, Hottinger, Sigonius, Cunæus, Godwyn, Leidecker, &c.

Under the new law, tithes are not established by Jesus Christ, or Christian dispensation, as they were under the old law by the ministry of Moses; the Christian priests, and the ministers of the altar of the new covenant, lived at first wholly upon the alms and oblations of the devout.

In after-times, the laity gave a certain proportion of their revenues

revenues to the clergy, but voluntarily, and not out of any constraint or obligation: the first instances we have of this, are in the fourth and fifth centuries.

This gift was called tithe, not that it was really a tenth part of their income, or near so much; but only in imitation of the tithes of the old law.

In the following age, the prelates in their councils, in concert with the princes, made an express law to the purpose; and obliged the laity to give a full tenth part of their revenues, their fruits, &c. to the ecclesiastics.

This the church enjoyed without disturbance for two or three centuries; but in the eighth century the laity got hold of part of these tithes, either by their own authority, or by grants and donations of the princes; and appropriated them to their own uses.

Some time afterwards they restored them, or applied them to the founding of monasteries or chapters, and the church consented, at least tacitly, to this restitution. In 1179, the third council of Lateran, held under Alexander III. commanded the laymen to restore all the tithes they yet held to the church.

In 1215, the fourth council of Lateran, held under Innocent III., moderated the matter a little; and, without saying any thing of the tithes which the laity already possessed, forbade them to appropriate or take any more for the future.

We may observe, that, upon the first introduction of tithes, though every man was obliged to pay tithes in general, yet he might give them to what priests he pleased, which were called *arbitrary consecrations of tithes*: or he might pay them into the hands of the bishop, who distributed among his diocesan clergy the revenues of the church, which were then in common. But when dioceses were divided into parishes, the tithes of each parish were allotted to its own particular minister; first by common consent, or the appointments of lords of the manors, and afterwards by the written law of the land. However, arbitrary consecrations of tithes took place again afterwards, and became in general use with us till the time of king John. This was probably owing to the intrigues of the regular clergy, or monks of the Benedictine and other rules, and will account for the number and riches of the monasteries and religious houses which were founded in those days, and which were frequently endowed with tithes. But in process of years, the income of the laborious parish-priests being scandalously reduced by these arbitrary consecrations of tithes, it was remedied by pope Innocent III. about the year 1200, in a decretal epistle, sent to the archbishop of Canterbury, and dated from the palace of Lateran, which enjoined the payment of tithes to the parsons of the respective parishes, where every man inhabited, agreeably to what was afterwards directed by the same pope in other countries. This epistle, being reasonable and just, and correspondent to the ancient law, was allowed of, and became *lex terra*. This put an effectual stop to all the arbitrary consecrations of tithes; except some footsteps which still continue in those *portions of tithes*, which the parson of one parish hath, though rarely, a right to claim in another: for it is now universally held that tithes are due, of common right, to the parson of the parish, unless there be a special exemption. This parson of the parish may be either the actual incumbent, or else the appropriator of the benefice: appropriations being a method of endowing monasteries, which seems to have been devised by the regular clergy, by way of substitution to arbitrary consecrations of tithes.

Fa. Paolo, in his "Treatise of Beneficiary Matters," is of opinion, that the custom of paying tithes, under the new

law, began in France; and affirms, that there are no instances of it before the eighth and ninth centuries: but he must be mistaken; for in the second council of Matiscona, held in 585, it is said expressly, that the Christians had a long time kept inviolate that law of God, by which tithe of all their fruits was enjoined to be given to the holy places, &c.

In effect, Origen (Hom. xi. on Numb.) thinks, that the old laws of Moses, touching the first-fruits and tithes, both of cattle and of the fruits of the earth, are not abrogated by the gospel; but ought to be observed on their ancient footing.

The 5th canon of the council of Matiscona orders tithe to be paid to the ministers of the church according to the law of God, and the immemorial custom of the Christians, for the use of the poor, and the redemption of captives, and that upon penalty of excommunication: which is the first penalty we find imposed on such as would not pay tithe. On which grounds it is that many among the modern clergy hold their tithes to be *jure divino*.

Others, on the contrary, plead, that the recompence to be given church ministers, is differently ordained by God, according to the differences he has put between his two great dispensations, the law and the gospel: under the law he gave them tithes; under the gospel, having left all things in his church to charity, and Christian freedom, he has given them only what shall be given them freely, and in charity. That the law of tithes is in force under the gospel, all the Protestant divines, except some among the English, deny; for though hire to the labourer be of moral and perpetual right, yet that special kind of hire, the tenth, can be of no right or necessity, but to the special labour for which God ordained it; that special labour was the Levitical and ceremonial service of the tabernacle, (Numb. xviii. 21. 31.) which was abolished: the right, therefore, of the special hire must be abolished too.

That tithes were ceremonial, is evident from their not being given to the Levites till they had been first offered as an heave-offering to the Lord, ver. 24. 28.

He, then, who by the law brings tithes into the gospel, brings in likewise a sacrifice, and an altar; without which, tithes, by the law, were un sanctified and polluted, ver. 32. And, therefore, they were never thought of in the first Christian times, till ceremonial altars and oblations had been brought back.

The Jews themselves, ever since their temple was destroyed, though they have rabbies, and teachers of the law, yet pay no tithes, as having no proper Levites to whom, nor any altar upon which to hallow them; which argues that the Jews themselves never looked on tithes as moral, but merely ceremonial. Add, that tithes were not allowed to the priests and Levites merely for their labour in the tabernacle; but in consideration of this likewise, that they were not allowed to have any other part or inheritance in the land (ver. 20. 24.), and, by that means, for a tenth, lost a twelfth.

Besides, it has been urged, that the priests and Levites were properly the officers and ministers of state under God as king of Israel; and the Israelites paying through their hands one-tenth to him, was agreeable to the custom of almost all nations to pay one-tenth to their king. Tithes, therefore, are to be considered as an appendage to the theocracy, and it has been said, that it will be extremely difficult to prove, that Christian ministers have a divine right to demand them, from this circumstance of a constitution peculiar to the Jewish nation. As to the original of tithes, judge Blackstone observes, that he will not put  
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the title of the clergy to them upon any divine right; though such a right certainly commenced, and, as he apprehends, as certainly ceased, with the Jewish theocracy; yet an honourable and competent maintenance for the ministers of the gospel is, undoubtedly, *jure divino*; whatever the particular mode of that maintenance may be. Accordingly, all municipal laws have provided a liberal and decent maintenance for their national priests or clergy: ours, in particular, have established this of tithes, probably in imitation of the Jewish law; and, perhaps, considering the degenerate state of the world in general, it may be more beneficial to the English clergy to found their title on the law of the land, than upon any divine right whatsoever, unacknowledged and unsupported by temporal sanctions. But, however beneficial this appointment may be to the clergy, it has been complained of as impolitic in a variety of respects, and peculiarly burdensome to the state.

Mr. Smith observes (*Nature and Causes of the Wealth of Nations*, vol. iii.), that tithes, as well as other similar taxes on the produce of the land, are in reality taxes upon the rent, and, under the appearance of equality, are very unequal taxes; a certain portion of the produce being in different situations, equivalent to a very different portion of the rent. In some very rich lands the produce is so great, that the one-half of it is fully sufficient to replace to the farmer his capital employed in cultivation, together with the ordinary profits of farming-stock in the neighbourhood. The other half, or, what comes to the same thing, the value of the other half, he could afford to pay as rent to the landlord, if there was no tithe. But if a tenth of the produce is taken from him in the way of tithe, he must require an abatement of the fifth part of his rent, otherwise he cannot get back his capital with the ordinary profit. In this case the rent of the landlord, instead of amounting to a half, or five-tenths of the whole produce, will amount only to four-tenths of it. In poorer lands, on the contrary, the produce is sometimes so small, and the expence of cultivation so great, that it requires four-fifths of the whole produce to replace to the farmer his capital with the ordinary profit. In this case, though there was no tithe, the rent of the landlord could amount to no more than one-fifth or two-tenths of the whole produce. But if the farmer pays one-tenth of the produce in the way of tithe, he must require an equal abatement of the rent of the landlord, which will thus be reduced to one-tenth only of the whole produce. Upon the rent of rich lands, the tithe may sometimes be a tax of no more than one-fifth part, or four shillings in the pound; whereas, upon that of poorer lands, it may sometimes be a tax of one-half, or of ten shillings in the pound.

It is a great discouragement to the improvement of land, that a tenth part of the clear produce, without any deduction for the advanced expence of raising that produce, should be alienated from the cultivator of the land to any other person whatever. The improvements of the landlord and the cultivation of the farmer are both checked by this unequal tax upon the rent. The one cannot venture to make the most important, which are generally the most expensive improvements; nor the other to raise the most valuable, which are generally too the most expensive crops; when the church, which lays out no part of the expence, is to share so very largely in the profit. When, instead either of a certain portion of the produce of land, or of the price of a certain portion, a certain sum of money is to be paid in full compensation for all tax or tithe; the tax becomes, in this case, exactly of the same nature with the land-tax of England. It nei-

ther rises nor falls with the rent of the land. It neither encourages nor discourages improvement. The tithe in the greater part of those parishes which pay what is called a *modus* in lieu of all other tithes, is a tax of this kind. Some have proposed, as a better method for raising a revenue for the clergy, to lay an equivalent tax upon all estates, cultivated or not cultivated. It is well known, and has often been lamented, even by the clergy themselves, that this method of raising a revenue for their subsistence, is a continual source of dispute between the clergy and their parishioners, and contributes to obstruct the usefulness of their ministry. In Holland, and some other Protestant countries, the civil magistrates have adopted what some have thought a better plan, by allowing their ministers a fixed stipend, paid out of the public funds.

In effect, for the first three hundred years after Christ, no mention is made in all ecclesiastical history of any such thing as tithes; though, in that time, altars and oblations had been recalled, and the church had miserably judaized in many other things. The churchmen confessedly lived all that time on free-will offerings: nor could the defect of paying tithes be owing to this, that there were wanting civil magistrates to enjoin it; since Christians, having lands, might have given out of them what they pleased; and the first Christian emperors, who did all things by advice of the bishops, supplied what was wanting to the clergy, not out of tithes, which were never proposed, but out of their own imperial revenues.

The first authority produced, setting aside the Apostolical Constitutions, which few of the patrons of the tithes will insist on, is a provincial synod at Cullen in 356, where tithes are voted to be God's rent: but before that time, divers other abuses and complaints had got ground, as altars, candles at noon, &c. And thus one complaint beget another; as it is certain that tithes suppose altars.

It is not easy to ascertain the time when tithes were first introduced into this country. About the year 794, Offa, king of the Mercians, made a law, by which he gave to the church the tithes of all his kingdom, in order, as it is said, to atone for the death of Ethelbert, king of the East Angles, whom, in the preceding year, he had caused to be basely murdered. But that they were paid in England before this time, by way of offering, according to the ancient usage and decrees of the church, appears from the canons of Egbert, archbishop of York, about the year 750, and from an epistle of Boniface, archbishop of Mentz, written about the same time to Cuthbert, archbishop of Canterbury, and from the 17th canon of the general council held for the whole kingdom at Chalchuth, in the year 787. But the law of Offa first gave the church a civil right to them in this land by way of property and inheritance, and enabled the clergy to recover them as their legal due, by the coercion of the civil power. However, this establishment of Offa reached no farther than to the kingdom of Mercia, over which he reigned; until Ethelwulph, about sixty years after, enlarged it for the whole realm of England. See REVENUE.

Judge Blackstone says, that possibly tithes in this country were contemporary with the planting of Christianity among the Saxons, by Augustine, the monk, about the end of the sixth century. But the first mention of them, which he has met with in any written English law, is in a constitutional decree, made in a synod held (as he says) A. D. 786, in which the payment of tithes in general is strongly enjoined. This canon or decree, which did not at first bind the laity, was effectually confirmed by two kingdoms of the heptarchy, in their

parliamentary conventions of estates, respectively consisting of the kings of Mercia and Northumberland, the bishops, dukes, senators, and people. This was a few years later than the time when Charlemagne established the payment of them in France, A.D. 778, and made the famous division of them into four parts; one to maintain the edifice of the church, the second to support the poor, the third the bishop, and the fourth the parochial clergy.

The next authentic mention of them is in the *Fœdus Edwardi et Guthruni*, or the laws agreed upon between king Guthrun, the Dane, and Alfred and his son Edward the Elder, successive kings of England, about the year 900. This treaty may be found at large in the Anglo-Saxon laws, and it not only enjoins the payment of tithes, but adds a penalty upon non-observance; which law is seconded by the laws of Athelstan, cap. i. about the year 930. This, he says, is as much as can be certainly traced out, with regard to their legal original. Blackst. Com. b. ii. c. iii. sect. 2. Burn's Eccl. Law, vol. iii. article *Tithes*.

The custom of paying tithes, or of offering a tenth of what a man enjoys, or of what he reaps from it, has not only been practised under the old and the new law, but we also find something like it among the heathens.

Xenophon, in the fifth book of the expedition of Cyrus, gives us an inscription upon a column, near the temple of Diana, by which the people were warned to offer the tenth part of their revenues every year to that goddess.

The Babylonians and Egyptians gave their kings a tenth of their revenues: see Aristotle in his *Oeconomics*, lib. ii. Diodorus Siculus, lib. v. and Strabo, lib. xv.

Afterwards the Romans exacted of the Sicilians a tenth of the corn they reaped; and Appian tells us, that those who broke up, or tilled any new grounds, were obliged to carry a tenth of their produce to the treasury.

The Romans offered a tenth of all they took from their enemies to the gods; whence the name of *Jupiter Prædator*: the Gauls, in like manner, gave a tenth to their god Mars, as we learn in the *Commentaries of Cæsar*.—And *Festus*, de Verb. Signif. assures us, that the ancients used to give title of every thing to their gods: "*Decima quæque veteres diis suis offerebant.*"

Authors have been strangely perplexed to find the original of a custom established among so many people of different manners and religions to give a tenth to their kings, their gods, or their ministers of religion. Grotius takes it to arise hence, that the number ten is the most known, and the most common among all nations; by reason of the number of fingers, which is ten. On this account he thinks it is, that the commandments of God were reduced to ten, for people to retain them with greater ease; that the philosophers established ten categories, &c.

*TITHES, Extra-parochial*, denote tithes which are not within the compass of any distinct parish. By the canon law, these were to be disposed of at the discretion of the bishop; but by the law of England, all extra-parochial tithes, as in several forests, belong to the king, and may be granted to whom he pleases. Accordingly they have been adjudged to him, not only by several resolutions of law, but also in parliament 18th Edw. I. But extra-parochial wastes and marsh lands, when improved and drained, are by 17th Geo. II. c. 37, to be assessed to all parochial rates in the parish next adjoining.

*TITHES, impropriated and appropriated*, called also *infeodated tithes*, are those alienated to some temporal or ecclesiastical lord, united to their fee, and possessed as secular goods. See *APPROPRIATION* and *IMPROPRIATION*.

By the council of Lateran, held under Alexander III. in 1179, the alienation or infeodation of tithes is prohibited for the future: whence all infeodations made since that time are generally held, by the canonists, illegal.

Some attribute the original of these impropriated tithes to Charles Martel; and hold him damned for first giving the revenues of benefices to secular nobles. But Baronius will have this to be a fable, and refers their origin to the wars in the Holy Land; which is also the opinion of Pasquier.

The tribute, it seems, which the Romans imposed on all the provinces of their empire, was a tenth part of all the fruits: hence several authors observe, that the Franks, having conquered the Gauls, and finding the imposition established, they kept it on foot, and gave those tithes in fee to their soldiers; and this, say they, was the origin of infeodated or impropriated or appropriated tithes. But the truth is, they are not so ancient; nor do we find any mention of them before the reign of Hugh Capet; even the very council of Clermont, held in 1097, as hot as it was in the interest of the church, does not say one word of them; which yet would undoubtedly have made loud complaints of such an usurpation, had it been then known.

*TITHES, Portion of*, denotes titles which the parson of one parish hath a right to claim in the parish of another. These portions, which might probably, at least in part, have been owing to the lord of a manor's estate, extending into districts which are now apportioned into distinct parishes, are in law so distinct from the rectory, that if one who has them purchases the rectory, the portion is not extinct, but remaineth grantable. The cognizance of these belongs, like that of other tithes, to the ecclesiastical court.

*TITHES, as Obstructions to Agriculture*, the impediments and hindrances which they throw in the way of the progress and improvement of the land and its cultivation and amendment. It has been said to be the instruction of our natural as well as revealed religion, that a portion of our property is due for the maintenance and support of the worship of God, and that "those who serve at the altar, should live by the altar;" but that whether a special proportion of one-tenth of our yearly income from land is due to the clergy by divine and unalterable right, is a point which has been warmly agitated, and much controverted. Under the Jewish government, it is well known that tithes were directed to be paid by divine appointment. And it has been stated by bishop Butler, that under the Mosaic dispensation, God himself assigned to the priests and Levites, tithes and other possessions, and that in these possessions they had a divine right; a property quite superior to all human laws, ecclesiastical as well as civil. But that every donation to the Christian church is that of a human donation, and no more; and therefore cannot give a divine right, but such a right only as must be subject, in common with all other property, to the regulation of human laws. How far the claim to tithes on the principle of divine right remains still established in Catholic countries, is not well known; but this sort of claim to tithes has long since ceased in this country. And it is remarked by a late writer, that the conduct of Henry VIII. of England, and of Charles I. of Scotland, furnishes indubitable proofs of their holding a different opinion; as those kings, on the abolition of popery, in place of transferring the tithes from the Roman Catholic clergy to their successors in office, assumed the right of granting the greatest part of them to the nobility and great laymen of the time; and in the latter kingdom in particular, with the burden only of reasonable stipends to the Protestant clergy. And further, that the grants of  
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tithes made by these kings and their successors having been either directly and indirectly ratified by parliament, are now to all intents and purposes the property of the successors of these original grantees.

The historian Gibbon has stated that tithes appear to have been common in all ages. That the first Christian emperor, Constantine the Great, was very liberal to the church; and in the year 321, published an edict, granting his subjects full liberty to bequeath any extent of property they chose to the clergy. But that this, in place of proving that a tenth of the produce was payable to the clergy in the early ages of Christianity, shews, it is thought, the direct contrary;—that the clergy, instead of having any legal right to tithes, were supported by charitable or gratuitous donations, and not by assessments made either under divine or human laws. The period or time, however, when the payment of tithes was established by law, is noticed by Montesquieu, in his Spirit of Laws, who states that no one questions but the clergy opened the bible before the time of Charlemagne, and preached the gifts and offerings of the Leviticus. But that he dares say, before that prince's reign, though the tithes might have been preached up, they were never established. And the above historian not only fixes this period, but the reason of it too, in the manner below: the synod of Frankfort, held under Charlemagne in the year 794, furnished, it is said, a cogent motive to pay the tithes. A capitulary (statute) was made in it, wherein it is said, that in the last famine the ears of corn were found to contain no seed, the infernal spirits having devoured it all; and that those spirits had been heard to reproach the people with not having paid tithes; in consequence of which it was ordained, that all those who were seized of church-lands should pay the tithes; and the next consequence was, the obligation extended to all.

The writer of a late agricultural report has stated, that in this country, tithes, or a tenth of the produce of the fruits of the earth, as well as of cattle, have been so long established, that without asserting their divine right, it may be maintained, that every estate in the kingdom was once subject to them, and that every exoneration has arisen either from encroachment, from royal grant on the dissolution of the abbeys, or from impolitic concession, by accepting a specific sum of money in lieu of them, which, as it does not vary with the times, has left the clergy in many parishes and districts of the kingdom without any adequate provision. All modes and compositions real, are, it is said, of this nature; but that, as many of these are fixed and irrevocable, it must be left to the discretion of the patrons, or the interference of the legislature, to redress the evils which they have produced, and to fulfil the scripture maxim, that "the labourer is worthy of his hire."

And that when it is considered, that the title by which a tenth of the produce of agriculture is appropriated to the church, is far more ancient and better ascertained than that to the other nine parts, it will appear surprising that the dues of the clergy should in general be paid with reluctance, and that lay proprietors, on the contrary, should find little difficulty, either in obtaining a fair rent for their lands, or a reasonable composition for their tithes. Yet the fact is indisputable, it is said, that incumbents, however moderate in their demands, can seldom advance the composition for their tithes in any proportion to their value, without exposing themselves to obloquy and opposition; or if they take their tithes up, are frequently subject to expences and inconveniences, besides producing an unfavourable effect on agricultural improvement, to encourage which ought to be no less the object of private than of public policy.

That the farmer, when he takes a bargain of the farm kind, which is subject to tithes, will undoubtedly estimate the proportion he is to pay to the incumbent, not according to what may have been demanded twenty or thirty years ago, but what it is actually worth at the present moment; and that if, by the lenity or forbearance of the rector or vicar of his parish, he may pay less, he ought to consider it as a sacrifice that often can be ill afforded, and as laying him under an obligation which he should endeavour to return by every means in his power. Were this the case, that harmony which the good of religion, and the interest of the parties require, would, it is thought, be preserved inviolate; and that none but the extortionate incumbent would be the object of deserved enmity and reproach. The writer too has seen many good effects resulting from the proprietors of titheable land becoming personally responsible to the clergyman, and letting their estates, especially when there are no leases, tithe-free. The advantage is mutual; and it prevents misunderstandings as well as an opposition of interests, which frequently arise, when the tenant and the incumbent are left to themselves.

That, upon the whole, the rights of the clergy are exacted with extreme moderation, small as many of their livings are, in most parts of this portion of the country. That no very great part of their tithes is taken in kind, in many places; yet that notwithstanding, complaints exist of the hardship of tithes from the farmer, and of the unpleasant situation in which the incumbent is sometimes placed, by trying to raise his humble benefice to two-thirds, or even one-half of its real worth. Hence, it is conceived, there must be something radically wrong in a system, which excites prejudices in the most liberal and enlightened minds, and which equally militates against the interests of religion and those of agriculture.

Having thus briefly stated the nature of the origin of tithes, and the difficulties which attend them, as they respect the clergyman and farmer, it may be proper and necessary to inquire to what uses they were applied, after a legal right to demand them had been obtained, and how far the clergy of the present day follow out in practice the principle on which they were originally made payable. It has been remarked by the writer of the work on Modern Agriculture, that in regard to the question, whether the tithes in this part of this country be now appropriated to the uses for which they were at first paid, whether voluntarily or by compulsion? it will be necessary to go back to the first introduction of the tithing system into the country. Bede states, it is said, that about the year 597, Gregory the Great, then pope, sent a monk of the name of Austin into England, to propagate the gospel, and to introduce a system of church-government among the people. Austin having succeeded to the utmost of his wishes, and having received a grant of land from the then king of Kent, besides donations from private individuals, for the support of himself and the priests whom he had brought along with him, found it necessary to apply to the pope for directions in regard to the manner in which these royal and private donations should be applied. Gregory solved the monk's question, by replying, that it was the custom of the church to divide such voluntary gifts as Christians were pleased to bestow in four parts: to give one to the bishop, another to the inferior clergy, a third to the poor, and to set aside the fourth for erecting and upholding churches or places of worship. And in confirmation of this, it may be noticed, that Blackstone has remarked, that at the first establishment of parochial clergy, the tithes of the parish were distributed in a fourfold division; one for the use of the bishop, another

for maintaining the fabric of the church, a third for the poor, and the fourth to provide for the incumbent: but that when the sees of the bishops became otherwise amply endowed, the bishops were prohibited from demanding their usual share of these tithes, and the division was in three parts only. In considering the state of tithes in the fourteenth century, he likewise takes notice of an act of Richard II. enjoining the bishops to allocate a proper sum out of the tithes of each diocese, for the sustenance of poor parishioners; remarking, in addition, that it seems the people were frequently sufferers by withholding of those alms, for which, among other purposes, the payment of tithes was originally imposed.

The first of the above two writers observes farther, that at what period the superior clergy of England first possessed themselves of the tithes, in defiance of the original destination, and of many statutes made to enforce an application of them to the uses for which they were first made payable, it is unnecessary to inquire. It will not be denied, however, it is thought, by the keenest stickler for the prerogatives of the church, that in place of one-third of them being applied for the use of the officiating clergy, one-third for the support of the poor, and the remaining third for the repairs of the churches, which, when the bishops had acquired land in mortmain, or free alms, sufficient to support their dignity, was the destination originally intended; the tithes payable in England are now very differently, although not, it is said, so legally, appropriated. Those people, says the writer, who are most disposed to cry out "the church is in danger," when the real or supposed rights of the clergy are invaded by the slightest attempts to alienate the tithes, ought to reflect that the third of all the tithes in England, whether in possession of the church or of the laity, ought to be allowed for the support of the poor; that another third ought to be expended in the repairs of the churches, the expence of which is now defrayed, in almost every instance, by an assessment on the parishioners; and that the last third ought to fall to the officiating clergymen, many of whom are the most miserable of the sons of men.

But it is not by any means, it is said, intended to censure the present members of the church of England for alienations of rights that took place centuries ago; far less to insinuate that that respectable body have not an unquestionable right to the value of such a proportion of the produce of the soil, as will enable them to fill the stations in which they are placed with dignity and honour. The object which is here aimed at, is the giving a succinct account of the particulars and circumstances in which the payment of tithes in kind operates against the introduction of improvements in agriculture, and the advancement of religion; and by shewing the manner in which the alteration in the tithing system was effected in Scotland, to endeavour to point out a way in which the future payment of tithes in England may be arranged, so as to meet the purposes, and most effectually promote the interests of agriculture, without in the smallest degree infringing on the rights of the individuals concerned in paying or receiving them.

There are many different ways in which the payment of tithes in kind operates unfavourably to the general advancement and prosperity of the husbandry of this country. According to the writer of the Essays on rural affairs, it is universally considered as a grievance; there being, it is said, scarcely an agricultural survey of a county, in which it is not stated as an evil that ought to be removed. And this the author thinks no wonder, as the drawing of tithes in kind, when it is examined with attention, will be found to

operate directly, in the strictest sense of the word, as a tax on industry; and to be, at the same time, more vexatious in the mode of collecting than perhaps any tax that has ever been adopted, or had recourse to, on any occasion.

It is conceived to be a measure that has an injurious and unfavourable effect on four different descriptions of society, as the farmer, the landholder, the clergyman or improprator of the tithe, and the public.

As to the first, or the farmer, he is more or less affected, according to the differences of the nature, circumstances, and situation of the land which he may hold. The intelligent writer on Modern Agriculture, noticed above, considers it unfortunate, though certainly the case, that the payment of tithes in kind operates more against the spirited improver than against the slovenly and indolent; and that tithes, as the law now stands, cannot be considered so much the tenth of the natural produce of the soil, as a tenth of the capital employed by the farmer in its cultivation and improvement. For instance, if a farmer pays his ploughman ten pounds a year of wages, his labourer ten-pence a day for his labour, or the landlord a hundred pounds of rent, he must consider himself as advancing one-tenth part of these sums for the purpose of promoting the interest of the tithe-owner, who not only receives annually a sum equivalent to the tenth part of this capital, but that tenth improved to the highest degree which the unremitting exertion of the tenant is able to effect. Mr. Locke, it is continued, in his Treatise on Civil Government, remarks, that it is labour which puts the greatest part of the value upon land, without which it would scarcely be worth any thing. That it is to that we owe the greatest part of all its useful products; for all that the produce of an acre of wheat is more worth than the produce of an acre of as good land which lies waste, is the effect of labour. Hence, it is thought, the farmer furnishes a fund to purchase the necessary labour, whereby an acre of land is rendered so productive as to afford six, or eight, or ten shillings yearly of clear revenue to the tithe-owner, which, but for the application of that labour, would have remained unproductive for ever, in so far at least as he was concerned. So much is this the case, it is said, that if a farmer expends one hundred pounds on the purchase of manure, the improvement and cultivation of his farm, and the payment of the rent; and if the value of the crop, when sold, amounts to one hundred and ten pounds, he is actually a loser to the extent of five pounds, or what may be the interest of one hundred pounds for a year. He indeed gets his capital of one hundred pounds returned, but the tithe-owner draws the ten pounds, or rather more, or, which is the same thing, the value; so that the farmer has employed his capital to enable the tithe-owner to draw a dividend of 10 per cent. on that capital; whereas had he lent it on mortgage, or placed it in the funds, he would have benefited himself and his family to the extent of the interest or the dividend which he, in either of these cases, would have himself received. So much, it is said, for the absurdity of attempting to improve lands under such circumstances. The able writer of the above named Essays likewise, after stating different ways in which tithes operate against the tillage or corn-farmer, strongly remarks, that in this country, besides commons and wastes, much very fine land is allowed to remain in grass in a very unproductive state, which, with a very little or moderate degree of industry and outlay of money upon it, might be made to yield abundant crops of corn: and the reason assigned for this disgraceful state of management and want of production, which is so called, because, were it altered, even the grass-land might be easily made twice as productive

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tive as it is by a judicious use of the plough, is, that the tithe of corn-land is so very heavy, as deters the farmer from having recourse to the plough: whereas in Scotland, where the corn-tithe is never drawn in kind, immense tracts of country, which thirty years ago were covered with heath, and totally unproductive even of grass itself, are now converted into fertile fields that yield abundant crops of corn and grass; and which, if the tithe-laws had there existed, must, in all probability, have continued unproductive until the end of time. This is a contrast that is very striking to every one, it is said, who travels through these parts of that country; and that it brings forward a practical fact, which ought, it is thought, to outweigh a million of speculative arguments.

The intelligent author of the Present State of Husbandry in Great Britain states, that another grievance to which farmers are subjected, in the payment of tithes in kind, arises from the harsh and oppressive manner in which the payments are sometimes exacted. The nature and extent of this grievance may, it is said, be learned by a perusal of the extract which is given below, from the same writer's Agricultural Report of the County of Northampton; where it is stated, that it has happened, (though, to the credit of the tithe-owners be it said, the instances are very few or rare,) where, when the tithes have been let for the purpose of oppression, the tithing-man has been known to exert that authority with which he was invested; that he has not only taken the tenth shock of corn, and the tenth cole of hay, but also the tenth lamb, pig, hen, egg, &c.; nay, has even gone into the garden, and taken not only the tenth part of the fruit, but likewise the tenth of the produce of the kitchen-garden. Under such circumstances as these, it may be asked, who is the farmer that would not feel himself aggrieved? From this it must appear, it is thought, obvious, that whether the farmer's interest or happiness be considered, it must be equally his desire that some arrangement should be effected, whereby the payment of tithes in kind should for ever be abolished; for, as the writer of the Agricultural Report of the County of Buckingham very justly, it is said, observes, it may be laid down as a proposition, that whatever profit arises to the cultivator of the soil, by the force of superior ingenuity and industry, should be held sacred by the church and government. If it be otherwise, it discourages the improvement of the soil; and thereby the church prevents the future increase of her tithes, and the government the future increase of its taxes.

It has been ably contended by the writer of the Essays on rural subjects, already noticed, that though the tithe-laws are hurtful to the farmer, they are perhaps still more so to the proprietor or land-holder. Whatever checks, it is said, the industry of the farmer, must, in a direct manner, diminish the income of the landlord; and as the energy of a farmer, when once excited, is well known to augment in proportion to the advances he has made, whatever checks that energy in the bud, occasions in time a diminution of income to the proprietor, much greater than can be easily conceived. And that, as it is supposed the proportion of rent which can be afforded for arable land, increases with the productiveness of that land in a much higher degree than in the ratio of the quantum of the crop; whatever tends to render land permanently more productive than before, if no deduction be made from it, tends, at the same time, to augment the income of the proprietor in a still higher degree than that of its produce. But as it is obvious that the tithe operates as a dead bar to the commencement of improvements in agriculture upon any soil of no great degree of fertility, so as to prevent the beginning of that motion, from the acceleration of

which alone the proprietor can hope to derive considerable increase of rent; in all cases his rent is diminished in a much higher ratio than one-tenth, as it might seem to do by those who take only a slight view of the matter. It is added, that should the proprietor of poor lands, seeing the impossibility of the tenant's improving them, attempt to render these more permanently fertile by the outlay of stock upon them, that he never expected to draw back; but would content himself with a reasonable return of interest on the capital in the name of rent, he would not find the case much altered. He sets out, it may be supposed, with this principle, that if he can secure a permanent rent, equal to 5 per cent. on the money expended upon them, he will be very well satisfied with it. Let us say, then, that twelve bushels of grain were the neat expence of culture, &c. which, on an average of all sorts of corn, was valued at 4s. the bushel; and that he had expended 20l. the acre, the interest of which, at 5 per cent., is 20s. or in other words, five bushels. But that before he can draw this rent free of tithe, the average produce must be, at least, eighteen bushels, out of which must be taken one bushel and nine-tenths, so that instead of five, his rent will be reduced to 3 per cent. nearly; while the tithe-owner will be entitled to draw nearly 2 per cent. for ever, on the capital which the improver had thus expended. It is almost needless to add, it is said, that under such circumstances it is vain to look for a general spirit of agriculture, either among proprietors or tenants, to both of which descriptions of persons the operation of the tithe-laws are, it is contended, highly oppressive.

And another instance is stated of very material importance, in which tithe becomes singularly pernicious and prejudicial to proprietors of land. The importance of keeping and preserving the whole produce of the ground upon the farm where it was raised, for the purpose of making manure, seems, it is said, to be very generally understood; as a clause to that effect is universally found inserted in the leases in every county of England, wherever leases are granted at all. What punishment, it is asked, would the proprietors of these lands deem adequate to the crime of selling off the whole produce of the farm every tenth year? Yet great as this crime would be, it would not be adequate, in point of damage to them, to the right of drawing tithe in kind from their arable lands; because the farmer who sold the produce would, at least, become possessed of money to replace, in some degree, by means of extraneous manures, the loss he had incurred by the abstraction of the home-dung. Those who are entitled to draw the tithe in kind are, in fact, by this means, vested with a power of enriching themselves, or their own private property, if they be so inclined, at the expence of every other proprietor around them. In this point of view, therefore, tithes are singularly pernicious to proprietors of land. This is unquestionably an objection to the drawing of tithes in kind that can probably never be well got over by any of those who are so favourable to the present tithing system. It strikes at the very vitals of all our improvements in husbandry and rural business.

Besides, the writer of the work on modern husbandry considers that inasmuch as the spirit of improvement is depressed and checked, the land-holder must be injured; and that as there are no regulations or laws existing in this country which have such a tendency to impede the introduction of new or improved modes of husbandry as those of exacting the payment of tithes in kind, there are, of course, none that operate so decidedly against the landed interest of the kingdom. If, it is said, the farmer be restrained from inclosing, draining, purchasing manure, in short, from cultivating

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tivating and improving his land to the highest degree, who will deny that the interest of the owner is affected? And that this is the case in a variety of instances, from the operation of the tithelaws, is admitted by every one who is perfectly acquainted with the present state of agriculture in this country.

In respect to the improprators of tithes, it may be noticed that, if the interests of religion and the clergy be considered, it will be found that the system of taking the tithes in kind is equally productive of bad consequences. It will be discovered to disturb the harmony of society, and to be often the means of creating such disputes and divisions between the clergyman and his parishioners, as renders the religious instructions of the former of little avail. Among the many instances which might be mentioned of the teasing and vexatious circumstances of this nature that occur to unhinge the harmony which ought to subsist between the clergyman and his parishioners, that which is given below, from the Agricultural Report of the County of Hants, may be sufficient. In this case the clergyman and the farmer were at variance; and the farmer, determined to be even with the clergyman, gave him notice that he was going to draw a field of turnips on a certain day. The clergyman accordingly sent his team and servant at the time appointed, when the farmer drew ten turnips, and desired the other to take one of them; saying he should not draw any more that day, but would let him know when he did. This fully shews the vexatiousness of the practice of tithing in this manner.

Further, that in a political point of view it is also injurious, as tending to loosen that chain of intercourse and connection which, it is conceived, is of so much importance to keep united. The interest of the clergy would likewise be greatly promoted, were they to receive an equitable compensation for their tithes, in place of drawing them in kind, or of making annual arrangements with the farmers.

But it is the lay proprietors, it is said, that are the most blameable in respect to the rigorous manner in which the tithes are collected. It is said that clergymen, who act up to the character in which they stand in the scale of society, (and the most violent declaimer against them will not pretend that a very great majority of that respectable body do not so act,) very generally sacrifice so great a portion of their just demands for the sake of peace and quiet, that, if the expence of collecting be added, there is scarcely any composition that can be proposed which it would not be for their interest to accept. Some instances there no doubt are, where the clergyman, being of a turbulent, avaricious disposition, lays hold of every advantage, and collects his tithes to the value of the uttermost farthing: but it ought to be remembered, that a clergyman who does so, nay, that a clergyman who submits to the drudgery of collecting tithes in kind, must lose, in the opinion of the parishioners, a great share of that respectability of character, which it is his indispensable duty to support and keep up.

And in relation to the public, the effect which this injudicious regulation has, is equally prejudicial and mischievous. It comes in, according to the author of *Modern Agriculture*, for its share of the loss arising from the effect which the tithelaws have on the husbandry of the country, as, by their operation, the quantity of corn that might be cultivated, did not such laws exist, is diminished to an immense degree, and other branches of the art of farming are greatly impeded. Besides, they check industry, by depressing the farmer's spirit, and by preventing the circulation of money that would be expended in improvements, and in the pur-

chase of the manufactures of the country. Were no such laws in force, the proprietors and farmers, in consequence of the success of the improvements which in that event would be undertaken, would be enabled to purchase more of the manufactures of the country, pay a greater share of the taxes for the support of the state, and after all, live in a greater state of ease and comfort, than under the existing circumstances they are able to do. In short, it is considered that the abolition of these laws is the only measure that can be adopted with any probability of success, at least the first one that ought to be attended to, with a view of again bringing the corn-trade to turn once more in favour of this country. When all these various circumstances are conjoined; and when it is further considered that, except in Spain and Portugal, there is scarcely a civilized nation in the world where this system of church-slavery is allowed to exist; and that even in Russia tithes are abolished; it may be reasonably hoped that the period is not far distant when England will be relieved by legal and constitutional means, and in consequence of arrangements made on liberal principles, from this almost Egyptian bondage.

It further likewise appears, from the accounts given by different writers on the subject of tithes, that they were paid in the latter end and ages of the Romish church with great reluctance; and even in this country during the reign of Henry VIII. Therefore it is said, that if, when improvements in agriculture were in their infancy, and at a period too when men's minds were held in slavish servitude by the clergy, the payment of tithes in kind could hardly be enforced, can it be supposed wonderful, that in these enlightened days it should be considered as a grievance? At a period when the principles of religion and of real genuine liberty are better ascertained, and more generally known, than in any former age, it is not surprising that laws compelling the payment of tithes in kind, laws which originated in edicts issued by bigotted kings under the influence of designing priests, should now be found inimical to the best interests of the country, and to the happiness of so many thousands. That this is the case, every inhabitant of this island has ample opportunities of satisfying himself by a perusal of the agricultural reports of the different counties of England and Wales, which have been lately published. And that as these reports, after having been circulated among the proprietors of land and farmers for their correction and amendment, still contain, in their republication, the same or similar complaints in respect to the hardships which the farmers are subjected to, and the injury which agriculture sustains, by the continuance of the payment of tithes in kind, such complaints may justly be deemed the voice of the people proclaimed in a constitutional way; and as such, merit the most serious and speedy attention of the legislature and of the clergy.

A few of the injurious effects of the practice of paying tithes in kind have been noticed above, and many more of the hardships proceeding from it are recorded in the different agricultural county surveys and other works which have been only slightly touched upon in what has been already said upon the subject. And the necessity of something effectual being done, in order to the removal of so inconvenient and oppressive a regulation, has been strongly shewn in the writings of the various advocates of the improvements of British husbandry and farming, as well as by many other able and intelligent writers on matters connected with them, but which, for want of room, cannot be considered here.

As, therefore, some reform in the mode of paying tithes in this country must be admitted to be indispensably necessary,

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fary, it is to be wished that the legislature, especially at the present time, would devote that attention and consideration to the subject which its importance and necessity demand, and the clergy come forward with such reasonable propositions for the adjustment of the business as may be suitable, as by such means the matter might, and no doubt would, be soon easily settled to the satisfaction of all the parties concerned.

In the view of affording a proper knowledge of the most suitable means of effecting so important an alteration, the author of the "Present State of Husbandry" in this island, gives the following clear account of the beneficial arrangement which took place in respect to tithes in Scotland, and of the circumstances which led to it. It is stated, on the authority of Erskine's "Institutes of the Law of Scotland," that the payment of tithes in kind was continued for many ages in that kingdom; and that, owing to the precariousness of the climate, it was attended with more grievous hardships than could have taken place in the southern part of the island. Every Scotch proprietor or farmer, who presumed, after reaping their corns, to carry off any part of them from the field, until the person having right to the tithe had drawn his share, were, from the first establishment of this right, subject to severe penalties. The tithe-owner, on the contrary, either from indolence, a desire to oppress, or with a view of compelling the proprietor or farmer to purchase his tithes annually at a high price, frequently delayed drawing his share until a great part of the crop or produce was rotten. Notwithstanding several statutes were enacted with a view of checking the oppressive disposition which so often evinced itself in the conduct of the clergy in this respect, yet these grievances continued to exist, more or less, until the year 1633; when a decree-arbitral, passed by Charles I. in 1629, for arranging and determining a mode, to be afterwards adopted, for the payment of tithes, was ratified by parliament.

That during the struggle for the establishment of this or that form of church-government, great alterations had taken place, both in regard to those having right to the tithes, and to the manner in which they were exacted. On the Reformation, the benefices of the church fell to the crown, and were, at different periods, gifted for services, or other considerations; such as for supporting universities, hospitals, &c.; and the persons obtaining them were denominated lords of erection, and sometimes called by other names. They likewise got, or assumed, the right of nominating officiating clergy on all vacancies. These alienations were, by act of parliament, 1587, put a stop to; and such tithes as had not been previously disposed of, remained with the crown unalienably. The tithes, which were then annexed to the crown, may be valued and leased by the proprietor of the lands, but cannot be purchased. The officers of the crown are in use to grant leases of this description of tithes for nineteen years, and which are renewed as matters of course on paying a reasonable sum on such renewal. The sum demanded is regulated by the yearly value of the tithes; so that a capital equal to between five and six years' amount of the tithes, laid out at the commencement of the lease, and improved by compound interest, is sufficient to produce such a sum at the expiry as will obtain renewals to perpetuity.

Some of the clergy remained, it is said, in possession of their benefices after the Reformation; and the vacancies that happened in such benefices were filled up by those who assumed the right of presentation. An act of parliament was soon afterwards passed, whereby the patrons were deprived of the right of patronage: but in compensation

for this supposed hardship, it was enacted, that the right of all tithes, so possessed by the clergy, should be vested in those who had exercised the right of patronage. Patrons having acquired tithes in this way, are compelled by law to sell them at nine years' purchase of the yearly value of the tithes.

The system of tithes and tithing having, however, got into great confusion, in consequence of the various alterations that took place in the government of the church of Scotland, those interested found it necessary to submit their several rights and claims to the determination and final award of Charles I., who, on the 2d of September, 1629, pronounced two decrees-arbitral, or judgments, which laid the foundation of that arrangement respecting tithes, and the payment of the established clergy in Scotland, which has been productive of so many good consequences.

The most important article in these two decrees-arbitral, is that which directs the valuation and sale of tithes; after which, the land-holder is entitled to the whole crop upon payment to the proprietor of the tithes of a yearly rent, or to purchase them at an easy rate, subject to a reasonable provision to the clergy. The words of this famous decree are, it is said, that "the rule of all tithes, where they are valued jointly with the stock, shall be a fifth part of the constant yearly rent that is paid for the lands." Another material circumstance in the valuation of tithes in Scotland is, that the rents of mills, those arising from recent improvements, and some others of less importance, are deducted from the gross amount.

By these decrees, which were ratified in parliament in 1633, the proprietors of land not having right to the tithes, were not only found entitled to sue the titular in an action at law to ascertain their value, but, unless vested in the crown, to obtain a purchase of them on established terms, as mentioned above. Thus, ever since 1633, every landholder in Scotland has had it in his power to acquire right to his own tithes, either by purchase, or lease, so that they should be no longer payable in kind. Nevertheless, those who neglect to sue for a valuation may still be subjected to all the inconveniences of the former law; as under such circumstances, those having right to the tithes may draw them in the manner commonly practised in England. The remedy is, however, so easy, that he must be a fool indeed who would subject himself or his tenants to such a slavish servitude, while he has it in his power, by a simple application to the supreme court of the country, to abolish it for ever.

Some instances are, however, recollected, where proprietors in the north of Scotland, having a right to the tithes, and being unwilling to forego all the power of harassing their tenants, which attached itself to the ancient feudal barons, still continued to draw the tithes for some time. But they at last became ashamed of such conduct; and there is not now, it is said, one instance where tithes are paid in kind, or where the tenants have any concern, either directly or indirectly, with or in the payment of tithes on the north side of the Tweed. How then, it may be asked, are the Scotch clergy provided for? The answer is, it is said, easy; the stipends provided by law for the maintenance of the Scotch clergy are still payable out of the tithes. The judges of the court of sessions, who act as commissioners for the arrangement of tithes, have a right to modify reasonable stipends to the parochial clergy. And accordingly, in all such cases, where the clergyman can shew that the parish is a place of more than ordinary resort, that the cure is burdensome, or that the necessaries of life give a high price in that part of the country, or that the scanty

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scanty allowance of stipend in that parish bears too small a proportion to the weight of the charge, provided there are free and unappropriated tithes in the parish, the commissioners, on the application of the clergyman, grant an additional stipend, either in money, but more generally, where practicable, in grain, as being less fluctuating in value than money. But that owing to the free tithe in the parish having been previously assigned to the clergyman, some instances do occur, where the commissioners have it not in their power to augment his stipend, although it be too small for the decent maintenance of a numerous family. In all such cases it would, it is thought, be highly proper to apply part of the bishop's tithes, such as are now payable to the crown, to the purpose of rendering the situation of these clergymen, who are so unfortunately situated, more decent and respectable.

In order to the introduction of a suitable arrangement in regard to tithes in this part of the country, it is remarked, that the question has been for some time past very popular, and much agitated; and that many difficulties have been started, apparently for the purpose of rendering it more perplexed and complicated than it is in reality. Holding it as a sacred and inviolable principle, that tithes, as now payable in England, were formerly appropriated for particular purposes, and that although in many instances alienations were made at different periods; yet that as these are expressly or virtually confirmed by those laws which protect national and individual property; therefore tithes, as now payable in the southern part of the island, are payable in conformity to the laws of the country. This being granted, no man who has a regard for justice, who venerates the constitution, or who would not wish to see the rights of property invaded, but must be satisfied, that if the present mode of paying tithes is abolished, the clergy and the lay-proprietors of tithes are, in law, justice, and equity, entitled to an equivalent. What that equivalent ought to be, and in what manner ascertained, becomes the question. It is observed, that it is not by appeals to quarter-sessions, nor by special acts of parliament for this or that particular diocese or parish, that this great national question can be determined with propriety: it is only by a submission of all rights and claims of both parties to the determination of some one respectable individual, that the matter can be amicably or equitably decided. And it is thought, that the most proper individual to be made choice of is the sovereign, or person holding the government of the country.

The clergy, it is said, need not be afraid to appeal to such an arbiter, as in the course of a great length of time there has been no instance of any degree of infringement of or upon their rights. The land-holders and lay tithe-owners may keep their minds at ease, as though the most sacred regard for religion has been evinced, yet it has been divested of superstition or bigotry. If, it is continued, Charles I. during the anarchy of church-government that prevailed in his time, found no difficulty in passing a decree in a similar case, which, having received the sanction of parliament as a matter of course, laid the foundation for a just and equitable arrangement of the tithes, the business may unquestionably be accomplished with much less difficulty at the present period. The probable consequences of such a submission would, it is thought, be, that the arbiter would no doubt appoint commissioners to examine and ascertain the yearly value of all the landed property in England, the produce of which is subject to the payment of tithes. Were the yearly value of the lands ascertained by a corn-rent in place of one in money, and which, it is supposed, might be easily done by taking the average price

of corn for the seven or ten years or more last past, with the exception, however, of 1795, and some other scarce and dear years, the clergy could sustain no loss, nor would after valuations in consequence of the depreciation in the value of money, be rendered necessary.

This being done, a fifth, a sixth, or any other given proportion of the free rent, after the payment of parliamentary taxes affecting land, would be declared due to the tithe-owner in lieu of the payment of tithes in kind. One clause of the decree would probably, it is thought, be, to compel every lay-owner of tithes to sell his right to the land-holder, at a fair and equitable, but regulated price; and another would most likely be, declaring the clergy entitled for ever to a fifth or sixth, or some other determinate proportion of the present real free rent of all titheable lands, to which they may have right, and subjecting the proprietors to the regular payment thereof. Thus at once would, it is said, a load which has for many ages pressed down the spirit of the English farmers, be removed, and that while all ranks and degrees must applaud the equity and the propriety of the arrangement, a spirit for agricultural improvements would evince itself superior, it is thought, to any of which the records of this country make mention.

It is supposed that this mode is the less exceptionable, as it is almost similar to that adopted when acts of parliament are passed for enclosing particular parishes. At the first meeting of the commissioners named in such acts, they direct, that all having interest may deliver in their claims, and the rights or grounds on which they claim, against a certain day. Those being afterwards examined by the commissioners, who are neither more nor less than arbiters appointed by the legislature, their decision constitutes the law in regard to the right by which the individual proprietors hold the lands, which by the arbiter's award is assigned to them. In place, therefore, of multiplying acts of parliament respecting the adjustment of tithes *ad infinitum*, one only, and that a very short one, seems necessary, authorizing the governing person to arbitrate between the owners of the tithes and the land-holders; and whose award, like that of the commissioners appointed under acts of parliament for enclosures, should be final, and have the effect of law. Having thus laid down the general principle, it will not be expected that any attempt will be made to combat the little difficulties that may be started against the practicability of carrying the measures founded thereon into effect. These the wisdom of the arbitrator will be fully sufficient to obviate and direct. One thing is certain, it is supposed, namely, that a decree-arbitral or judgment, pronounced by such high authority, and founded on these principles, would give universal satisfaction to every party concerned.

On a matter which is so very interesting and important to the English land-holder and farmer, it will be necessary and useful to bring to the inquirer's notice and attention a few of the different other modes and plans which have been suggested at different times by different writers for effecting the business and adjustment of the matter of tithes.

The intelligent writer of the *Essays on rural affairs* has supposed, that the tithes of or in England and Wales should be converted, so as to make a payment in money be universally received in lieu of the payments in kind that are at present exigible; but under such modifications as to prevent the possibility of those who are entitled to draw the tithes from suffering by the depreciation in the value of money, which we have seen for a long time past has been going on in a regular progression; and which may be expected to continue; or may, perhaps, as at this time in a neighbouring country, be sunk almost to nothing by some political shock

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that cannot at present be foreseen. With these views, might not, it is asked, a law be obtained, authorizing the valuation of tithes, in every case where either of the parties interested in it should so incline? This might be done, it is said, by a summons raised against all the parties concerned, either before the sheriff of the county where the property lay, or before any other judge that should be thought more proper for executing the office; who, after hearing the parties, should proceed to make a legal inquest to obtain a clear proof what had been the amount of the tithes, actually paid and drawn, for five, ten, fifteen, or twenty years last past, as should be judged the most proper, out of the several lands in question; specifying distinctly the quantity of each denomination of grain, or other titheable produce. But as it may easily be foreseen, that it would be a matter of great difficulty, in many cases, to get at these facts with precision, might it not be put in the power of the judge, if the parties could not agree as to that particular, to appoint two or more persons of good character in the neighbourhood, to gather up the tithes in kind themselves, fairly and honestly, for five years next to come, without favour to any person; the amount to be delivered to the persons having a right to receive them, after the quantities had been respectively ascertained, so as to admit of the collectors making up an account of the whole, upon oath, to be delivered to the judge; who, from that account so made up, should cause an average to be struck of the quantities of each particular article; which average quantities, after deducting a just proportion for the expence of collecting, and taxes affecting the tithe, should be declared by him to be the legal tithe exigible from the land in question in all time to come? But as there is room to suspect that the money prices of corn, wool, &c. of different denominations, may rise to be much higher in some future period than it was at that time; instead of then ascertaining the price of these articles, let it be declared, that the quantities of grain and other articles resulting from the averages respectively, are payable out of the respective lands, leaving the average prices of such grain, &c. to be settled and ascertained each year, as is specified below; declaring that the money which shall arise from the average prices thus ascertained, should be in lieu of the whole tithe that could be exacted each year; the time of payment too to be specified. And, in order to prevent all disputes as to the average prices of these articles in time to come, let the sheriff of each county be authorized and required to make an inquest at a certain period each year of what has been the actual ready money selling price of corn of the preceding year's crop, from the time the crops were reaped till this time, and of wool, as well as of all other titheable articles for the former year, by examining witnesses before a jury to be appointed for that purpose, which prices, after being thus ascertained, should be published and declared to be those by which the quantity of tithe-corn of each particular description, and other titheable articles, contained in any degree of valuation, should be payable for the crop of the preceding year. Thus, it is said, would the tithe-owner be entitled to receive payment of his tithes, without any extraordinary expence or trouble, or unjust deduction or dispute whatever: the farmer would be allowed to carry on his operations uncramped by those galling restraints which the tithe-laws at present perpetually throw in his way: the proprietor would be at liberty to apply such part of his capital as he might incline, towards promoting agricultural improvements, with a reasonable prospect of being benefited by his exertion: and the public would become possessed of a quantity of surplus produce of land, which it can have no prospect of ever otherwise en-

joying, which would be the means of diffusing a perpetual plenty through every corner of the land.

Mr. Pitt too, in his account of the agriculture of a midland district, suggests, that the mode or scheme to be adopted as the outline of an exchange of tithes, should be for land, in the manner directed below, as land will always bear a value proportionate to that of its produce, and that even the price or value of labour is measured by the same standard. This is, that an act of parliament should appoint, in every diocese, an equal number of the most respectable clergy and country gentlemen commissioners and trustees, with a power of nominating surveyors, to value all the tithes belonging either to the clergy or laity within the diocese; and that this act should be let give an option to the land-owners of purchasing their respective tithes, at the valuation fixed on them by such commissioners and surveyors; the money arising from such redemption being invested in the funds, or other more proper securities, until a suitable opportunity should offer of laying it out in the purchase of land; and that, where the land-owners should refuse to purchase such tithes, the commissioners should have the power of mortgaging them, or of taking up money on their security, to be invested in the same way with that arising from the tithes actually sold; or after a given time, the trustees might be empowered to set apart an allotment of the land of those owners who refuse to purchase, and which, if conveniently situated for the former tithe-owner, might be so applied, otherwise sold; and the money arising from such sale invested as before, until it could be laid out in the purchase of land. The execution of some such plan or mode as this, would, it is supposed, be attended with infinitely less trouble and expence than now incurred by the annual valuation of tithes; as, should such a regulation be once effected, the business would be settled for ever: while under the present system, the surveyor or valuer's business is never done, but continued from year to year; and, if it should remain, will be from generation to generation. An equivalent in land must certainly, it is thought, be a more solid property than tithes. Land too may be improved in any degree by good management and industry: tithes fluctuate or sink in value at the will of the cultivator. Some such commutation as this may, it is thought, be readily and easily effected, and that all parties would be pleased with the alteration.

The concluding remarks and suggestions on this greatly interesting matter, are the result of the investigations and enquiries of two clergymen, who have been lately engaged in drawing up accounts of the state of the agriculture of two large counties of the kingdom; those of Hereford and Berks. The former states, that of the various modes proposed to effect the desirable object of a general commutation of tithes, that of a corn-rent seems to have met less objection than most others which have been yet proposed; still, however, nothing has been seriously attempted, and the matter remains open to further discussion. It has not, perhaps, it is said, occurred to every one, that tithes, in their present form, have a direct and powerful tendency towards increasing the prices of wheat and of every other grain, by creating obstacles to its culture, and thus diminishing the quantity which would otherwise be grown. But that the single fact, that an acre of land under the culture of wheat, is liable to a deduction on account of tithes, in nearly a ten-fold proportion to that of an acre of land grazed by cattle or sheep, is surely sufficient evidence that tithes must operate unfavourably to the culture of grain, and consequently to its abundance and cheapness. How desirable then is, it is said, such a commutation as would render this payment equally heavy on every acre of land, according to its value, whether

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it be applied to the culture of grain, or to the production of animal food. Under this impression it is here proposed, that in lieu of tithe, a tax be imposed, on the principle of an equal land-tax, upon every estate, according to its value, for the support of the clergy. The wisdom of parliament would, it is supposed, easily determine how many shillings in every pound of rent would be equal to the revenues to which the clergy have a claim, and that the measure would be greatly facilitated by the investigations occasioned by the income or property act lately in force. The tenant might be made liable in the first instance to the payment of the duty proposed as a substitute for the tithe, but in case of his default, the landlord might be made ultimately responsible.

In this mode of arrangement, the clergy, it is supposed, would receive what is their due, a full equivalent for tithes in its present state; the security would still attach to the soil itself, and their revenues would still increase with the increase of the value of land and its produce. Encouragement would thus be afforded to increase the culture of grain; the industrious farmer would not have to contribute more than is just proportion; the tithe-owners too would obtain the fair value of their property; the clergy of the church of England would acquire that degree of respect and esteem to which few will deny that they are, in the aggregate, entitled; and, above all, they would be enabled to fulfil the valuable purpose of their institution: while at present, the clergyman who demands but the fair value of his property, becomes hated, and often insulted; and, to use the strong language of some, his "integrity becomes suspected; his every action is seen through a false medium; and the pastor is lost in the collector of tithes!" If it should be objected, that under this or any other mode of commutation, the farmer would not eventually be benefited, because the landlord would then receive what is now paid to the tithe-owner; and that the farmer has no just ground of complaint, as he engaged his farm subject to the deduction or payment of tithes: let it be understood that the interest of the community at large, not of any one branch of it, is here contended for.

The writer maintains, that the great object of a commutation of tithes, beyond a religious view of it, is the relief of the corn-field, and not the farmer. Perhaps, it is said, if the subject be well considered, the farmer would gain less in a commutation than any one class of society. Tithes, in their present form, may check his improvements, may contract his system of farming and his capital, may harass his mind, and lead to personal animosities and expensive litigations; but probably his mere payments in lieu of tithe would, on the whole, be as heavy under any commutation, as those to which he is now liable. The public, it is said, must give that price for grain, at which it will answer the farmer to raise it; and that supposing it possible that the farmers throughout the island were to engage in a combination, to convert so much of their present tillage into pasture, as would leave only half the usual number of acres under corn, the inevitable consequence would be, that grain would sell at an enormous price, and the farmer would receive that increased price, at a time when his expences were diminished in the proportion of his tillage. Thus the consumer, which is the public, and not the farmer, would suffer; and if a tax, such as tithes, added to the increased price of timber, iron-work, and labour, should induce the farmer gradually but materially to contract his tillage, there could be no hope that grain would be sold during any considerable period at a moderate price; nor could there be an adequate supply for the wants of the country, without the

aid of large importations, which are always precarious, and sometimes impossible: and as animal food invariably rises in value with the increased value of grain, the farmer might thus be enriched at the expence of every other branch of the community. The plan or mode here proposed for a commutation would, it is presumed, counteract or prevent these serious evils; encouragement would be given to an extended culture of grain; and a new motive to industry and exertion would be found in the consideration, that the most indolent farmer must contribute an equal sum with the most active and successful cultivator.

The latter of these clergymen thinks, that in regard to tithes in secular hands, though the church may suffer in the amount of its income, it derives a considerable degree of security for what it still possesses, from this very circumstance; and consequently only touches on the subject so far as to propose that they should be commuted for land, according to their value. To this no reasonable objection is seen, or any insuperable difficulty, if a legislative plan were once chalked out for its accomplishment. But as for tithes in the hands of the clergy, whether great or small, it is supposed they might be beneficially commuted, by first taking their fair valuation by two competent sworn commissioners, one of whom should be named by the incumbent, and thus fixing a sum to be paid according to the combined prices of *corn*, *meat*, as mutton and beef, and *malt*, to be taken on the average of the seven preceding years, and to vary with the times every subsequent seven years. And in order to prevent any thing personal between the incumbent and his parishioners, except in the duties of his vocation, the overseers and churchwardens to be made the responsible agents in collecting and paying the sum to be raised, with certain provisos and securities against misapplication and loss. A corn-rent alone is, it is said, found to be an inadequate mode of commutation; but that taking the three great articles of life in every family, *bread*, *meat*, and *malt*, the clergyman would be secure from injury, and the farmer, paying only in proportion to the value of his produce, would have no reason to complain. It is to be observed, however, that it is wished for the laws to act uniformly for the benefit and security of the parochial minister, without subjecting him to the necessity of coming forward in a personal and partial light. By these means, what he might lose in the influence of fear, would, it is thought, be amply compensated for on the principle of love; without which he can seldom be happy himself, or discharge the duties of his sacred office with effect and satisfaction.

Where lands have been exonerated from tithes by an act of parliament, and an allotment made in land in lieu of them, even where an adequate value has been given, which in no instance that has fallen under the writer's notice is, it is said, really the case, it is throwing too much land into mortmain, it is subjecting the incumbent to all the cares and incumbrances of landed property, and driving him to the necessity of becoming a farmer, for which he is often ill qualified, or of letting lands, according to the existing laws, on such conditions, that improvement must be checked, and industry languish.

In order, however, to obviate some of the evils resulting from a practice that has already, it is said, become too general, it is proposed, that after having reserved a sufficient glebe, which in every instance should be done, with a due regard to the value of the living, the incumbent should be allowed to lease the remainder, at the full value, with the consent of the patron and the bishop, on a running lease, determinable every three or seven years, at the option of either of the two principal contracting parties. A new incumbent

cumbent would thus, it is supposed, without waiting too long, have an opportunity of improving his property, if he thought it capable of being so; and the tenant, having a fair prospect of occupying the land under any change, would feel himself equally safe in making improvements, as if he rented of a layman. All dilapidations and repairs on the farm, however, should fall on the tenant; who ought not only to be bound in proper covenants, but be obliged to give due security for their performance, as well as the payment of the rent.

Or, to land belonging to the clergy, the *corn, meat, and malt* rents might, it is said, be applied as well as to tithes with leases for twenty-one years certain, which would probably be the most eligible mode, as it would give uniformity to the plan of clerical provision, and would always afford an income according to the times.

Upon the whole consideration of the subject, there cannot be any doubt but that great advantage and improvement would arise to agriculture, from some measure of this nature being had recourse to and carried into execution; and though the farmer might not perhaps, on the whole, experience any great diminution in the quantity of money which he would have to pay, he would be wholly freed from the anxiety, trouble, and vexation, which constantly attend the taking of tithes in kind, and at the same time, which is much more important and material, be left at full liberty to exert his utmost endeavours to promote all kinds of improvements, which the nature of his farm may with propriety admit. And in this way, and by such means, the art of agriculture would be carried forward to such a state of improvement and perfection as cannot be easily conceived. Besides, such a measure might have a considerable effect in promoting the inclosure and cultivation of much land still in the disgraceful situation of waste, all which are desirable objects on various accounts in the present state of the country.

**TITHE-Rate.** See **RATE-Tithe.**

**TITHES, Subtraction of.** See **SUBTRACTION.**

**TITHING, DECENNA, or Decury,** a number or company of ten men, with their families, knit together in a kind of society, and all bound to the king, for the peaceable behaviour of each other.

Anciently no man was suffered to abide in England above forty days, unless he were enrolled in some tithing.—One of the principal inhabitants of the tithing is annually appointed to preside over the rest, being called the *tithing-man*, the head-borough, and in some countries the borsholder, or borough's elder, being supposed the discreetest man in the borough, town, or tithing. The distribution of England into tithings and hundreds is owing to king Alfred. See **DECINERS, FRANK-Pledge, and FRIBURGH.**

**TITHONIA**, in *Botany*, was so named by professor Desfontaines, in allusion to the glowing light-orange tint of its flowers, which the French call *couleur aurore*. The fabled favourite of Aurora, Tithonus, is therefore here meant to be commemorated. The allusion would have been still more happy, had the flower been one of the everlasting kind.—Desfont. Ann. du Mus. v. 1. 49. Willd. Sp. Pl. v. 3. 2246. Juss. 189. Lamarck Illustr. t. 708. Poir. in Lam. Dict. v. 7. 690.—Class and order, *Syngenesia Polygamia-frustranea*. Nat. Ord. *Compositæ oppositifoliae*, Linn. *Corymbiferae*, Juss.

**Gen. Ch.** *Common Calyx* cylindrical, of a double row of ovate-oblong, acute, flat, nearly equal, erect scales. *Cor.* compound, radiated. Florets of the disk numerous, all perfect, level-topped, tubular; limb five-toothed; tube inflated near the base. Those of the radius female but abor-

ting, about twelve; limb elliptic-lanceolate, acute, entire, horizontal, flat. *Stam.* in the disk only, Filaments five, capillary, shorter than the tube; anthers united into a cylinder of the same length. *Pistl.* in the disk, Germen oblong, slender; style thread-shaped, the length of the partial corolla; stigmas two, recurved, obtuse; in the radius, germen very small; style scarcely any. *Peric.* none, except the unchanged calyx. *Seeds* in the florets of the disk only, solitary, ovate, smooth; their crown of five short, acute, erect, membranous scales. *Recept.* convex, chaffy, its scales concave, acute, rather taller than the seeds.

**Eff. Ch.** Receptacle chaffy, convex. Seed-crown of five chaffy scales. Calyx cylindrical; its scales equal, converging, in two rows. Florets of the disk inflated at the base; those of the radius elliptic-lanceolate.

1. *T. tagetiflora*. Marigold Tithonia. Desfont. as above, t. 4. Willd. n. 1.—Native of Vera Cruz. *Root* annual. *Stem* erect, alternately branched, leafy, a foot high. *Leaves* alternate, on long stalks, downy, crenate, reticulated with veins, triple-ribbed; the lower ones deeply three-lobed; upper undivided, ovate, or somewhat heart-shaped, acute. *Flowers* on long solitary stalks, at the end of each branch, orange-coloured, about the size of a French marigold.

**TITHOREA**, in *Ancient Geography*, a town of Greece, in the Phocide, on mount Parnassus, 80 stadia from Delphi. This place was famous for its sacred grove dedicated to Minerva, a temple with the statue of this goddess, and the tomb of Antiopé and Phocus. The temple of Esculapius Archagetes was situated 70 stadia from Tithorea. The inclosure which contained the chapel of Ilis was 40 stadia farther distant than the temple of Esculapius.

**TITHRASUS**, a town of Africa, in Libya, bordered by a river of the same name.

**TITHRONIUM**, a town of Greece, in the Phocide, in which was a grove sacred to Apollo, with some altars and a temple, but without a statue. This town was situated 15 stadia from Amphicea and 20 from Drymea, near the river Cephalissus. Pausanias.

**TITHYMALOIDES**, in *Botany*, so called from its affinity to *Tithymalus*, the *Euphorbia* of modern botanists, differs from that indeed merely in having the calyx gibbous on one side at the base.—Tourn. Inst. 654.—Two or three West Indian species of *Euphorbia* come under this description.

**TITHYMALUS**, *τιθυμαλος* of Dioscorides, supposed to be derived from *τιθος*, *the breast*, in allusion to the milkiness of the plant. Tourn. t. 18. See **EUPHORBIA.**

**TITI, SANTI DI**, in *Biography*, was born at Citta S. Sepolero, in the Florentine state, in 1538. He first acquired a knowledge of painting under the tuition of A. Bronzino, and afterwards of Bandinelli, but owes the greater part of his fame to his studies at Rome, where he long resided, and from whence, as Lanzi observes, he carried back to his native country a graceful and scientific style of art, not supported by much ideal beauty, but chiefly characterized by the truth and freshness of nature; and in expression he had few superiors in any school, none in his own. He adorned his pictures with pieces of architecture, which science he in a measure professed, and by its means gave great relief to his figures, and increased the dignity and beauty of his compositions. His principal works are, the Supper at Emmaus, painted for the church of St. Croce, at Florence; the Resurrection of Lazarus, in the Duomo di Volterra; and the Descent of the Holy Spirit, painted for a convent at Citta di Castello. He died at Florence in 1603, aged 65, leaving a son, *Tiberio Titi*, born at Florence in 1578, who followed the same art with his father, but not with equal success. In

general he painted small portraits very skilfully, and made drawings in black-lead; of which there is a large collection in the Florentine gallery, made originally for the cardinal Leopold de Medici. He died in 1637.

TITIAN, the name by which we are acquainted with that great master, who is universally regarded as the head of the Venetian school of painting, Tiziano Vecelli da Cadore. This justly distinguished artist was born of noble parents at the castle of Cadore, in Friuli, in 1480, according to Vafari and Sandrart; though Ridolfi, and others after him, place the date of his birth three years earlier, in 1477: but as Giorgione was confessedly older than he, and was born in 1478, we have preferred the authority of the former, as most likely to be correct. The education he received, first from Sebastiano Zuccati of Treviso, and afterwards from Giovanni Bellini at Venice, rendered him a diligent and subtle observer of nature. His early works exhibit the greatest correctness of imitation, but in a laboured and minute style, with a finish so highly wrought, that when, at a maturer age, he painted a picture for Ferrara of the tribute-money, in competition with Albert Durer, he excelled in nicety of pencilling that master of minuteness; with this difference, that his finish did not, like the German's, obtrude itself, and impede the general effect, but obtained grandeur by distance. This picture, to which he made no companion, as he soon after changed his style, now adorns the gallery of Dresden, and remains a proof of the sense this great artist entertained of the falsity of that taste, which seeks for gratification in mere finish, and which he deserted for the adoption of a style conveying general character instead of identity. It was from the better taste of his fellow pupil, Giorgione, that Titian imbibed a more exalted view of art, and was induced to quit the meaner and more confined style with which he commenced his practice; and some portraits which he painted about this time are scarcely to be distinguished from those of Giorgione himself. But he seems to have found it not exactly to his mind, and soon discovered a variety of style more congenial to his own feelings; less softened, and perhaps less grand, but more agreeable; a style which delights the spectator less by novelty of effect, than by the exactness of truth. His first work in this style, which is entirely his own, and may be denominated Tizianesque, is the archangel Raphael leading Tobiah, painted in his thirtieth year for the sacristy of S. Marciale; and soon after he painted the Presentation of the Virgin, at the Carita; one of the richest and most numerous of his compositions remaining.

When only eighteen years of age, he had painted a portrait of the head of the Barbarigo family, which excited universal admiration; and he was soon afterwards employed, in concert, or rather in rivalry, with Giorgione, to paint one of the fronts of the Fondaco de Tedeschi, when unhappily the jealousy already subsisting between these great artists was strengthened by the superior encomiums bestowed upon Titian. On the death of Giorgione in 1511, Titian succeeded him in several important commissions, and continuing to increase in renown, was invited to the court of Alfonso, duke of Ferrara, for whom he painted the celebrated picture of Bacchus and Ariadne, now in England. Here he became acquainted with the poet Ariosto, whose portrait he painted, and in return was celebrated by him in his Orlando Furioso.

About 1523, Titian produced the work which, above all others, elevates him in the scale of merit among painters; viz. the celebrated picture of the Death of St. Peter the Martyr, for the church of S. Giovanni and S. Paolo at Venice, which has by almost all artists and connoisseurs

been considered his chef-d'œuvre in history. This extraordinary picture was one of the first objects of French spoliation at Venice. It was painted originally on wood, but was transferred to canvas in France, in consequence of its having been much blistered from the wood by the effect of sea-water in its voyage to Marseilles; and it is now returned to its original station in a more agreeable, if not more perfect condition, than when it was first removed. The excellence of this picture procured him, according to Vafari, a commission from the senate to paint the battle of Cadore between the Venetians and the Imperialists, or the rout of Giaradadda, in which the action proceeded during a tremendous storm of rain. This grand work was destroyed by fire, but the composition is preserved to us by the print engraved by Fontana. Besides these, he painted several other public works, which, together with the friendly assistance of Pietro Aretino, whose pen delighted to dwell upon the powers of this great artist's pencil, spread his fame in every direction, and he was honoured with a superabundance of employment. In 1530, when Charles V. came to Bologna to be crowned by pope Clement VII. Titian was sent for by the cardinal Hippolito de Medici to paint the portrait of the monarch, which he did on horseback and in armour; which so pleased Charles, that he gave the painter 1000 crowns of gold, and declared he would never be painted by any body else. When Titian returned to Venice, he found Pordenone much employed and supported by several of the principal persons; but his great superiority soon became too manifest to be resisted, and he was more than ever employed, both publicly and in private.

In 1541 the emperor returned to Bologna, to hold a conference with the pope, and was again painted by Titian, as was also the cardinal Hippolito de Medici in a Hungarian dress. He also painted his friend P. Aretino, who about this time introduced him to Fred. Gonzaga, duke of Mantua, whom he painted, and also, for him, a series of the twelve Cæsars for a saloon in the palace; underneath each of which, Julio Romano afterwards painted a subject from each of their histories.

Titian had soon after the honour of painting pope Paul III., when he visited Ferrara in 1543, and was invited by that pontiff to Rome; but he excused himself at that time on account of an engagement with the duke of Urbino, whose portrait he painted with so much fire and truth, that Aretino honoured it with a sonnet, comparing it with that of Alexander by Apelles. He painted also several other pictures for the same duke of Urbino (Francesco Maria), and when he had completed his engagement there, accepted another invitation to Rome, sent by the pope, through the medium of cardinal Bembo.

He arrived there in 1546, according to Vafari, who was already known to Titian, having seen him at Venice, and was on this occasion honoured by the cardinal's appointing him Cicerone to this great painter; to conduct him through the city, and to shew him its beauties. Nothing could be more flattering than his reception by the pope, who immediately upon his arrival assigned him apartments in the Palazzo Belvidere, and employed him in painting his portrait at whole length, and those of the cardinal and the duke Ottavia, which gave universal satisfaction; but an Ecce Homo, which he painted as a present to the pope, was not esteemed by the Roman artists, whose minds were accustomed to the works of Raphael and M. Angelo. The latter is said to have remarked to Vafari, after seeing Titian at work on his Danæ, that it was a great pity the Venetian painters applied themselves so little to design, and had not a better mode of

study,

## TITIAN.

study, being so perfectly skilful in colour and imitation. Adding, "if this man were as much aided by art in design as he is by nature, and most particularly so in giving just resemblance of natural objects, he would be perfect; as he has a noble spirit, and a beautiful and lively manner."

He did not remain long in Rome, but on his return to Venice visited Florence, where he beheld with delight the great works of art with which it is adorned, and visited the grand duke Cosmo, who declined his offer to paint his portrait, perhaps, as Vafari observes, that he might not give umbrage to the ingenious artists of his own city and dominions.

Immediately upon his arrival at Florence, he received an invitation from his patron, Charles V., to visit Spain, and accordingly went to Madrid, where he arrived in 1550. He remained there three years, during which time he painted a great number of portraits and historical pictures. For the portrait which he painted of the emperor, he received 1000 crowns of gold, and was created a knight of the order of St. Jago, and a count palatine of the empire, with a stipend from the treasury of Naples of 200 crowns annually; and to this, Philip II. added afterwards 200 more, besides paying him munificently for each of his productions. When Charles had devoted his life to the austerities of a convent, he commissioned him to paint a large picture of the Trinity, accompanied by the Holy Virgin, and surrounded by saints and angels, in which the emperor, and the empress his wife, were represented elevated to the heavens, and in the act of adoration. There is a sketch of it in England, and a print has been engraven from the picture, by which it appears to have been a very grand work.

Though Titian had returned to his native place before Philip II. came into possession of the throne, and was as much engaged as he could be, yet that monarch, when he had built the Escorial, and conceived the idea of enriching it with the most splendid materials, resorted to his father's favourite painter to assist him in perfecting it; and though it does not appear that Titian returned to Spain, yet he must have employed his pencil very assiduously in its service from the very great number of his pictures which are to be found there, many of them among his very finest productions. Several of these have been withdrawn by the scruples of bigotry from public view; and among them his picture of a sleeping Venus, which was presented by Philip IV. to our Charles I., when prince of Wales, on his visit to Spain, and which after his death was purchased by the Spanish ambassador, then resident here.

Titian was invited by Henry VIII. to England, but his numerous engagements on the continent prevented him from coming. He painted, however, two pictures for Henry, which now adorn Cleveland House (the marquis of Stafford's). Their subjects are the Bath of Diana, with the unfortunate intrusion of Acteon, and the Discovery of the crime of Calista, and both are exquisite performances, and in tolerably good preservation. They continued in the royal collection till it was dispersed on the death of Charles I., and found their way into the gallery of the duke of Orleans; and on the purchase of the Italian part of that collection being effected by the duke of Bridgewater, the earl of Carlisle, and lord Gower, these pictures fell to the lot of the former of these noblemen.

This great painter is one of the happy few, for whom nature and circumstances have combined in fortunate conjunction. "For him," as Vafari justly observes, "health and fortune laboured, and he received of heaven only happiness and blessings." By him the highest among men, the

most learned, and the most beautiful, were proud to have their portraits transmitted to posterity. He was handsome in person and graceful in manners, and lived in a style worthy of one so honoured and beloved. These blessings he was permitted to enjoy through a very uncommon portion of human existence, which was at length interrupted by the plague in his 96th year. He appears to have been able to pursue his delightful art to a very advanced period, for Vafari found him painting in 1566, when he visited him at Venice, and speaks of it with pleasure; and though it may well be imagined that the latter productions of his pencil exhibit the strong hand of time, yet they are free and masterly in every thing in which a perfect knowledge of the principles of the art are concerned, and weak only in the execution.

Had Giorgione lived but to one-half of the lengthened years of his great rival, Titian might not perhaps have stood so completely at the head of the Venetian school of painting, as from his numerous excellent productions he now does. That noble work, the death of S. Pietro Martire, alone fully entitles him to this distinction and honour: perhaps no other production of the pencil is so perfect in the combination of every requisite quality of a fine painting; composition, design, action, expression, chiaro-scuro, and colour. The choice of the scene, and the accompaniments, are every way adapted to assist in creating alarm and dismay: the tone of evening or twilight spread over the whole, and contrasted to the brilliant ray of heavenly light from above, aids the impression; and the execution is in every part correspondent to the grandeur of form selected. This picture he painted, as we have said, in the prime of his life, when he was about forty-three; and he continued long after to work in the same style, which is of his own creation, and totally different from both his former laboured one, and his latter loose and vague manner. In this picture, every part is wrought to an exact character of representation, though without minuteness, or in any degree trespassing upon the heroic nature of the tragic subject; and there is no introduction of heterogeneous matter, as is too frequently to be found in his historic productions. Here he appears to have caught a glimpse of the grandeur of Michael Angelo's style, and to have employed it more effectually than in any other of his works, except perhaps in the figures on the ceiling of the Salute at Venice, and the martyrdom of St. Laurence in the Jesuits'. In general, his selection of form is but little improved upon his model; his male figures being too fleshy for character or action, and his females too full for elegance.

The mind of Titian appears to have been of a sedate and rather serious character. There is, as sir Joshua Reynolds has observed, "a senatorial dignity about him," which distinguishes him from his compeers of the Venetian school. All his compositions are arranged with gravity; even the gay and sometimes licentious subjects which he now and then amused himself with, are conducted with such a scale of chiaro-scuro and colour, as gives an air of morality to their effect, which imposes upon the spectator a tone of sobriety, and induces him to discard those loose thoughts which the gay luxuriance of the style of Rubens, treating the same compositions, would inevitably excite.

Colouring appears to have been the grand foundation of the success of Titian. He knew better than any other painter the just power of each colour of his palette; and by this knowledge, produced a species of chiaro-scuro independent of light and shade, and perfectly distinct from that of Corregio and Lionardo da Vinci, and more immediately imitative of the general effects of nature. Master of the

means of imitating the most subtle combinations of colour in visible objects, and fully comprehending the degrees of purity or of tone with which colours might be employed individually or collectively, to assist in projecting or withdrawing the various parts of a picture, he never fails to gratify the eye with a full and true relief, correspondent with the nature of the subject. In this quality he was as much ideal, as the Greeks and Florentines were in form; for though the harmony and richness which he produced are to be found occasionally in nature, it is neither her every day attire, nor is it to be comprehended by superficial observers. There is a science of exceeding import to painting in the arrangements of colours, by which a skilful artist will create attraction or disgust, as it pleases him. Change the position of the colours of that most beautiful of nature's works, the rainbow; let the blue and the green occupy the centre, and the red and yellow the edges of it; and judge how far it will decrease in its power of attraction. Of this science, Titian was the first great possessor; and as he possessed the knowledge of the value of colours, so also did he that of the nature of shade; that colour (to the painter at least, though it be the absence of it to the philosopher) which destroys all colours, and renders all alike obscure; and which is the most difficult of attainment in all that relates to the art of colouring. The tone of shade that Titian employed, whatever be the substance which produced it, was used by no other so successfully, except Tintoretto. It seems, in its union with the local colours of objects, to have produced the half tints without further labour; or at least to have laid such a foundation, as to have made that of the subsequent tinting very trifling; and doubtless this mode of proceeding rendered him able to produce such an infinity of works as appear to have issued from his pencil. His errors flowed naturally, from the ease with which he produced the beauties of his style; and as the mind was filled with gratification by the delightful harmony and richness of colour his works presented, so it sought the less for the qualities of expression, and appropriate dress and action in the figures; and would not condemn too rudely the frequent admission of heterogeneous matter.

To the accusations of exhibiting defects like these, the works of Titian are far less justly subject than those of his imitators and successors in the Venetian school of painting; none of whom possessed the taste and judgment of this great master, though many were eminently skilful in their respective departments.

**TITIANO, GIROLAMO DANTE**, called *Il*. According to Ridolfi, he was brought up in the school of Titian, and was employed by that master to assist him in several of his works. By frequently painting in conjunction with him, and sometimes copying his works, some of his pictures, retouched by Titian, have passed for originals by that master. He sometimes painted from his own designs, and his picture in the church of St. Giovanni at Venice, representing S. S. Cosmo and Damiano, is worthy of the school in which he was educated. Bryan's Dict.

**TITICACA, or CHUCUITO**, in *Geography*, a lake of South America, in the viceroyalty of Buenos Ayres, diocese of La Paz, and jurisdiction of Chucuito, the figure of which is oval, inclining nearly from N.W. to S.E., its circumference being about 80 leagues, and depth near the shore from four to six fathoms, and towards the middle forty or fifty, without any shoals. Ten or twelve large rivers, beside a great number of smaller streams, discharge themselves into it. The water, though neither bitter nor brackish, is somewhat turbid, and its taste is so nauseous that it cannot be drunk. It abounds with fish of two very

different kinds; one large and palatable, called by the Indians Suchis, and the other small, insipid and bony, long since called by the Spaniards Boyas. It has also a great number of geese, and other wild fowl, and the shores are covered with flags and rushes, the materials of which the bridges are made. The western borders of this lake are called Chucuito, and those on the E. are denominated Omaseuyo. It contains several islands, from one to another of which the Indians pass on their balsas, a kind of rafts, supported by inflated skins. One of these islands is very large, and was anciently one mountain, since levelled by order of the Incas: this gave to the lake its own name of Titicaca, which, in the Indian language, signifies a mountain of lead. In this island the first Inca, Mancho-Capac, the illustrious founder of the empire of Peru, invented his political fable, that the sun, his father, had placed him, together with his sister and consort Mama Oello Huaco, there, enjoining them to draw the neighbouring people from the ignorance, rudeness, and barbarity in which they lived, and humanize them by customs, laws, and religious rites dictated by himself; and in return for the benefits resulting from this artful stratagem, the island has, by all the Indians, been considered as sacred; and the Incas, determining to erect on it a temple to the sun, caused it to be levelled, that the situation might be more delightful and commodious.

This was one of the most splendid temples in the whole empire. Besides the plates of gold and silver with which its walls were magnificently adorned, it contained an immense collection of riches, all the inhabitants of provinces which depended on the empire, being under an indispensable obligation of visiting it once a year, and offering some gift. Accordingly, they always brought in proportion to their zeal or ability, gold, silver, or jewels. This immense mass of riches, the Indians, on seeing the rapacious violence of the Spaniards, are thought to have thrown into the lake; as it is certainly known they did with regard to a great part of those at Cusco, among which was the famous golden chain made by order of the Inca Huayna-Capac, to celebrate the festival of giving name to his eldest son. But these valuable effects were thrown into another lake, six leagues S. of Cusco, in the valley of Orcos: and though numbers of Spaniards, animated with the flattering hopes of such immense treasures, made frequent attempts to recover them, the great depth of the water, and the bottom being covered with slime and mud, rendered all their endeavours abortive. For notwithstanding the circuit is not above half a league, yet the depth of water is in most places not less than twenty-three or twenty-four fathoms.

Towards the S. part of the lake Titicaca, the banks approach each other, so as to form a kind of bay, which terminates in a river called El Defaguadero, or the drain, and afterwards forms the lake of Paria, which has no visible outlet; but the many whirl pools sufficiently indicate that the water issues by a subterraneous passage. Over the river Defaguadero is still remaining the bridge of rushes, invented by Capac Yupanqui, the fifth Inca, for transporting his army to the other side, in order to conquer the provinces of Collafuyo. S. lat. 16° 10'. W. long. 69° 56'.

**TITILLARES VENÆ**, a name given by some authors to the iliac veins.

**TITILLATION, TITILLATIO**, the act of tickling, *i. e.* exciting a sort of pleasurable idea, by a gentle application of some soft body, upon a nervous part; and which usually tends to produce laughter.

**TITILLICUM**, a word used by some anatomical writers for the arm-pit.

**TITINARA**, in *Geography*, a mountain of Russia, in  
tho

the government of Upha. N. lat. 52° 25'. E. long. 61° 14'.

TITIOPOLIS, in *Ancient Geography*, a town of Asia, in Iauria, or the second Cilicia, one of the twenty-three towns, which, according to the Notitia of Hierocles, were under the metropolis of Seleucia; named Titopolis by William of Tyre.

TITISNESS, in *Geography*, a small island near the coast of Lapland, at the entrance of a bay called Titsfiord. N. lat. 67° 35'.

TITIUM FLAVUM, in *Ancient Geography*, a river of Illyria, which discharged itself into the sea at Scardona, and served as a boundary between Liburnia and Dalmatia. Pliny. It is named Titus by Ptolemy.

TITIZIGHE, in *Geography*, a seaport town of the principality of Guriel, with a good harbour, on the Black sea. This place is also called Pghino; 10 miles S. of Puti.

TITLARK, in *Ornithology*. See ALAUDA Pratenfis.

TITLE, TITULUS, an inscription put over any thing, to make it known.

The word is more particularly used for the inscription in the first page of a book, expressing the subject of it, the author's name, &c.

What tortures abundance of authors, is to find specious titles for their books: a title should be simple, and yet clear: these are the two genuine characters of this kind of composition. Assuming titles are prepossession against the authors.

TITLE, *Titulus*, in the *Civil and Canon Law*, denotes a chapter or division of a book.

A title is subdivided into paragraphs, &c.—Each of the fifty books of the Digest consists of a number of titles; some of more, others of less.

TITLE is also an appellation of dignity, distinction, or pre-eminence, given to persons possessed of the same.

The titles of order or dignity, Loyseau observes, should always come immediately after the name, and before the titles of office.

The king of Spain has a whole page of titles, to express the several kingdoms and signories of which he is master. The king of England takes the title of *king of Great Britain and Ireland*: the king of France, the title of *king of France and Navarre*: the king of Sweden intitles himself *king of the Swedes and Goths*: the king of Denmark, *king of Denmark and Norway*: the king of Sardinia, among his titles, takes that of *king of Cyprus and Jerusalem*: the duke of Lorraine, the title of *king of Jerusalem, Sicily, &c.*

The cardinals take titles from the names of some churches in Rome: as of St. Cecilia, St. Sabina, &c. and they are called cardinals of the title of *St. Cecilia, &c.*

The emperor can confer the title of prince, or count of the empire; but the right of suffrage in assemblies of the empire depends on the consent of the estates.

The Romans gave the titles of Africanus, Asiaticus, Macedonicus, Numidicus, Creticus, Parthicus, Dacicus, &c. in memory of the victories obtained over the people of those countries. The king of Spain, after the like manner, gives honourable titles to his cities, in recompence for their services, or their fidelity.

TITLE expresses also a certain quality ascribed by way of respect to certain princes, &c.

The pope has the title of *holiness*; a cardinal prince of the blood, that of *royal highness*, or *most serene highness*, according to his nearness to the throne; other cardinal princes, *most eminent highness*; an archbishop, *grace and most reverend*; a bishop, *right reverend*; abbots, priests, religious, &c. *reverend*.

As to secular powers, to the emperor is given the title of *imperial majesty*; to king, *majesty*; to the king of France, *most christian majesty*; to the king of Spain, *catholic majesty*; to the king of England, that of *defender of the faith*; to the Turks, *grand signor and highness*; to the prince of Wales, *royal highness*; to the dauphin of France, *serene highness*; to electors, *electoral highness*; to the grand duke, *most serene highness*; to the other princes of Italy and Germany, *highness*; to the doge of Venice, *most serene prince*; to the republic or senate of Venice, *signory*; to the grand-master of Malta, *eminence*; to nuncios, and to ambassadors of crowned heads, *excellency*.

The emperor of China, among his titles, takes that of *tienfu*, son of heaven. The Orientals, it is observed, are exceedingly fond of titles: the simple governor of Schiras, for instance, after a pompous enumeration of qualities, lordships, &c. adds the titles of *flower of courtesy, nutmeg of consolation, and rose of delight*.

TITLE, in *Law*, denotes a right which a person has to the possession of any thing.

A title to lands is thus defined by sir Edward Coke: *titulus est justa causa possidendi id quod nostrum est*, or it is the means by which the owner of lands hath the just possession of his property. There are several stages or degrees requisite to form a complete title to lands and tenements. The lowest and most imperfect degree of title consists in the mere naked possession, or actual occupation of the estate, without any apparent right, or any shadow or pretence of right, to hold and continue such possession. See DISSEISIN.

The next step to a good and perfect title is the right of possession, which may reside in one man, while the actual possession is either in himself or another. The third circumstance attending a title is the mere right of property, the *jus proprietatis*, without either possession or even the right of possession. It is possible that one man may have the possession, another the right of possession, and a third the right of property. But in the union of these three qualifications consists a complete title to lands, tenements, and hereditaments. For it is an ancient maxim of the law, that no title is completely good, unless the right of possession be joined with the right of property; which right is then denominated a double right, *jus duplicatum*, or *droit droit*. And when to this double right the actual possession is also united, when there is, according to the expression of Fleta, *juris et seisinæ conjunctio*, then, and then only, is the title completely legal.

The statute 32 Hen. VIII. c. 9, hath provided, that no one shall sell or purchase any presented right or title to land, unless the vendor hath received the profits thereof for one whole year before such grant, or hath been in actual possession of the land, or the reversion or remainder; on pain that both the purchaser and vendor shall each forfeit the value of such land to the king and the prosecutor.

A title to things personal may be acquired or lost by occupancy, by prerogative, by forfeiture, by custom, by succession, by marriage, by judgment, by gift, by contract, by bankruptcy, by testimony, and by administration. Blackst. Com. b. ii. See POSSESSION and PROPERTY.

Title is also an authentic instrument, by which a man can prove and make appear his right.

There must be at least colourable title to come into possession of a benefice, otherwise the person is deemed an intruder. For prescription with title, see PRESCRIPTION.

TITLE, in the *Canon Law*, is that by virtue of which a beneficiary holds a benefice: such is the collation of an ordinary, or a provision in the court of Rome, founded on a resignation, permutation, or other legal cause. The title

of a benefice, or beneficiary, is either a true or a colourable one. A *true* or *valid* title is that which gives a right to the benefice: such is that received from a collator who has a right to confer the benefice on a person capable of it, the usual solemnities being observed. See **COLLATION**, &c.

*Colourable* title is a seeming one; *i. e.* such an one as appears valid, and is not. Such would that be founded on the collation of a bishop, in case the benefice in question were not in his collation.

By the canons, a colourable title, though false, produces two very considerable effects. 1. That, after peaceable possession for three years, the incumbent may defend himself by the rule *de trienniali possessione*, against such as would dispute the benefice with him. 2. That in case he be prosecuted within three years, and obliged to surrender the benefice, he shall not be obliged to restore the produce of it, during the time he possessed it.

**TITLE** is also used, in several ancient synods and councils, for the church to which a priest was ordained, and where he was constantly to reside.

“Nullus in presbyterum, nullus in diaconum, nisi ad certum titulum ordinetur.” Concil. Londin. ann. 1125.

There are many reasons why a church might be called *titulus*, title: the most probable Cowel takes to be this, that in ancient days the name of the saint to whom the church was dedicated was engraved on the porch, as a token that the saint had a title to that church: whence the church itself became afterwards to be called *titulus*.

**TITLES**, or *Titular Churches*, M. Fleury observes, were formerly the denomination of a particular kind of churches at Rome.

In the sixth and seventh centuries, there were four sorts of churches in that metropolis; *viz.* *patriarchal*, *titular*, *diaconal*, and *oratorial*. The *tituli*, *titular*, were, as it were, parishes, each assigned to a cardinal-priest, with a certain district or quarter depending on them, and a font for the administration of baptism in case of necessity.

**TITLE**, *Clerical* or *Sacerdotal*, denotes a yearly revenue or income of the value of fifty crowns, which the candidates for priesthood were anciently obliged to have of their own, that they might be assured of a subsistence.

By the ancient discipline there were no clerks made, but in proportion as they were wanted for the service of the church, which is still observed with regard to bishops; none being consecrated, but to fill some vacant see.

But for priests, and other clerks, they began to make vague ordinations in the East as early as in the fifth century: this occasioned the council of Chalcedon to declare all vague and absolute ordinations null.

Accordingly the discipline was pretty well observed till towards the end of the eleventh century; but then it began to relax, and the number of priests was exceedingly increased; either because the people became desirous of the privileges of the clericate, or because the bishops sought to extend their jurisdiction.

One of the great inconveniences of these vague ordinations was poverty, which frequently reduced the priests to sordid occupations, and even to a shameful begging. To remedy this, the council of Lateran laid it on the bishops to provide for the subsistence of such as they should ordain without title, till such time as they had got a place in the church that would afford them a settled maintenance.

There was also another expedient found out to elude the canon of the council of Chalcedon; and it was appointed, that a priest might be ordained on the title of his patrimony; that is, it was not necessary he had any certain place

in the church, provided he had a patrimony sufficient for a creditable subsistence.

The council of Trent retrieved the ancient discipline in this respect, forbidding all ordination, where the candidate was not in peaceable possession of a benefice sufficient to subsist him; and allowing nobody to be ordained on patrimony or pension, unless where the bishop declares it to be expedient for the good of the church: so that the benefice is the rule, and the patrimony the exception. See **ORDINATION**.

But this rule is not regarded, even in some Catholic countries, particularly France, where the patrimonial title is the most frequent; and the title is even fixed to a very moderate sum.

As to religious, the profession they make in a monastery serves them for a title, in regard no convent is obliged to maintain them: and as to mendicants, they are maintained upon the *title of poverty*.

Those of the house and society of the Sorbonne are also ordained without any patrimonial title, and on the sole title of poverty; it being supposed a doctor of the Sorbonne can never want a benefice.

**TITLE for Orders.** See **DEACON**, **ORDINATION**, and **PRIEST**.

**TITLIS**, in *Geography*, a mountain of Switzerland, in the canton of Uri, the most elevated in those parts, and scarcely inferior to the Schreekhorn and Jungfrauhorn: it was for a long time considered as inaccessible. The summit of this mountain is called Nollen, and commands a very picturesque scene of mountains and vallies; 11 miles S.S.W. of Altorff.

**TITMEG**, a lake of North America. N. lat. 62° 15'. W. long. 99°.

**TITMOUSE**, in *Ornithology*. See **PARUS**.

**TITOLO**, in *Geography*, a town of Naples, in the province of Basilicata; 6 miles S.W. of Potenza.

**TITONEUS**, in *Ancient Geography*, a mountain situated on the confines of Thrace and Macedonia.

**TITOVO**, in *Geography*, a town of Russia, in the government of Kaluga; 40 miles E.S.E. of Kaluga.

**TITSCHEIN**, *NEW*, or *Norwi Giezi*, a town of Moravia, in the circle of Prerau, well built and defended by walls; 24 miles E.N.E. of Prerau. N. lat. 49° 32'. E. long. 18° 10'.

**TITSCHEIN**, *Alt*, a town of Moravia; 2 miles S.W. of New Titschein.

**TITSCHIN**, a town of Moravia, in the circle of Olmutz; 16 miles S. of Olmutz.—*Also*, a town of Moravia, in the circle of Prerau; 8 miles S.W. of Freyberg.

**TITTERIE**, a southern province of Algiers, which extends from the river Mafassran, on the W., to the river Booberak, on the E.: northward it is bounded by the Mediterranean, and southward by Sahara; about 60 miles long and 40 broad.

**TITTERIE Gewale**, a lake of Algiers, situated near mountains; 60 miles S. of Algiers.

**TITTERIE Dofb**, or *Hadjar Titterie*, a ridge of precipices in Algiers: on the summit is a large plain, with only one narrow road leading up to it, where a tribe of Arabs keep their granaries; 50 miles S. of Algiers.

**TITTING**, or *DIETTING*, a town of Bavaria, in the bishopric of Aichstatt; 5 miles N. of Aichstatt.

**TITTIUS**, in *Botany*, a name given by Rumphius, Amboyn. v. 3. t. 19, and t. 20, to two very different kinds of trees, the latter of which is supposed by Jussieu to be a **CORNUTIA**. See that article.

**TITTMANING**, or *DITTMANING*, in *Geography*, a  
TOWN

town of the archbishopric of Salzburg, on the Salza. In the year 1310, a pestilential disease made such ravages in this town, that 1300 persons died between the 11th of November and the 2d of February following. In the year 1571, almost the whole town was burned down by lightning; 20 miles N.N.W. of Salzburg. N. lat. 48° 1'. E. long. 12° 44'.

**TITTUA**, in *Ancient Geography*, a town of India, on this side of the Ganges, which belonged to the Caræans. Ptol.

**TITUBATION**, in *Astronomy*. See TREPIDATION.

**TITUL**, in *Geography*, a town of Hungary, on the Theysse. This town has often been taken and retaken by the Imperialists and Turks; 24 miles E.S.E. of Peter Warden.

**TITULAR**, or **TITULARY**, denotes a person invested with a title, in virtue of which he holds an office or benefice, whether he performs the functions of it or not. In this sense the term is used in opposition to survivor, and to a person only acting by procurator, or commission. An officer is always reputed titular till he hath resigned his office, and the resignation hath been admitted.

**TITULAR** is also sometimes applied adjectively to a person who has the title and right of an office or dignity, but without having possession, or discharging the function of it.

It is sometimes also used abusively for a person who assumes and pretends a title to a thing, without either a right to it, or a possession of it.

**TITULAR Churches**. See **TITLES**.

**TITULARS of Tithes**, a term sometimes applied to persons who had the possession of tithes under the crown in Scotland. They had also other names or titles applied to them in some cases. See **TITHES**.

**TITULCIA**, in *Ancient Geography*, a town of Hispania Citerior, between Mantua to the N.E. and Toletum to the S.W.; marked in Anton. Itin. on the route from Saragossa to Emerita.

**TITUS**, in *Scripture Biography*, a disciple and companion of the apostle Paul, who attended him in many peregrinations to Jerusalem, Ephesus, and Crete, and who was deputed by him on several important services. For an account of the epistle addressed to him by St. Paul, see **EPISTLE**.

**TITUS VESPASIANUS**, in *Biography*, a Roman emperor, was the eldest son of Vespasian, and born A.D. 40. In the course of his education at the court of Nero, he made a great proficiency in the study of eloquence and poetry. In his military service he first ranked as tribune in Germany, and afterwards in Britain; and by his valour and skill, as well as by the graces of his person and manners, obtained great applause. On his return to Rome, he acquired reputation in the forum as a successful pleader. His first wife was the daughter of a Roman knight, and after her death he married a lady of illustrious descent, whom he divorced after she had borne him one daughter. Having distinguished himself as quaestor, he served as lieutenant under his father in the war of Judæa, during which he gained renown, not only by his military enterprises, but by the mildness and generosity of his temper; and though he did not abstain from the indulgences of youthful propensities, he did not neglect serious occupations. When Vespasian, after the death of Otho, was deliberating about assuming the purple, he acted as mediator in the confederacy between him and Marianus, the governor of Syria; and when Vespasian marched to Italy, Titus was entrusted with the prosecution of the war in Judæa. When his father took possession of the imperial authority, he declared Titus his colleague in the consulship, A.D. 70. In that year Jerusalem was taken after a calamitous siege, and the destruction of the temple, which

Titus wished to have preserved. After the reduction of Jerusalem, he went to Alexandria, and took part in the superstitious consecration of the ox Apis; and after having given audience to the ambassadors of the king of Parthia, he hastened to Rome with a view of counteracting some unfavourable rumours, and was honoured with a magnificent triumph. Vespasian admitted him to a participation of the empire, and they continued to co-operate in the exercise of the imperial power, and lived together in amicable intercourse. Suetonius, however, intimates that Titus's conduct was in a variety of respects very far from being irreproachable, either in private life or in his public character. During the war in Judæa, he had indulged a violent passion for Berenice, daughter of Agrippa I. king of the Jews, and widow of Herod, king of Chalcis; and as she followed him to Rome, he gave offence to the people by his attachment to a foreign queen of doubtful reputation; and, as Suetonius says, suspicions were entertained that Titus would eventually prove a second Nero.

Upon the death of Vespasian, A.D. 79, Titus immediately succeeded him; and by his conduct towards his rival Domitian, and to those who adhered to his interest, he gained the affection of the people, and established a character, which has caused him to be recorded under the glorious title of "The Delight of the Human Race." Although his reign was short, it was distinguished by a series of beneficent actions; not always, perhaps, equally liberal in the principle from which they originated. This course of beneficence was commenced by a confirmation of all the grants and donations made by his predecessors. And he thus established a precedent, which governed the conduct of his successors. Upon assuming the office of chief pontiff, he avowed it to be a solemn engagement not to shed the blood of a citizen, and to this resolution he adhered in a conspiracy against himself. In the case of one of the two patricians implicated in this crime, he calmed the anxiety of his mother by deputing a special messenger to assure her that her son's life was in no danger. Besides, he abrogated the law of high-treason with respect to all convictions for words or writings against the person or dignity of the emperor.

It was one of his maxims, "that no one ought to depart discontented from the person of his prince;" and on this he founded his practice of giving hopes to petitioners when he thought it necessary to refuse their requests. If we connect this maxim with his well-known exclamation at the close of a day on which he had conferred no benefit, "My friends I have lost a day," we cannot forbear suspecting that the benefits to which he referred were rather acts of private bounty to courtiers or importunate suitors, than the performance of public duties. Many instances occur of his love of popularity, and of the excess in which he indulged it. The public calamities that happened during his reign gave occasion for the exercise and display of his compassion and bounty; such were the great eruption of mount Vesuvius, which destroyed Herculaneum, Pompeii, and other towns; and the conflagration of Rome, which was followed by a fatal epidemic disorder. His general conduct entitled him to the affection of his subjects; nor does he seem to have deserved reproach for any act of injustice or oppression. Whilst he was on a journey to the country of the Sabines, he was seized with a fever, which terminated fatally, on the 13th of September, A.D. 81, in the 41st year of his age, and after a reign of two years and less than three months. Apprehending his dissolution, he lamented his early and premature doom; and yet, though his death was deplored at Rome as a general calamity, it was perhaps, considering the flexibility of his disposition, and his inclination to profuse

expenditure, favourable to his own reputation and to the public prosperity and happiness. Suetonius. *Ann. Un. Hist.* Crevier's *Rom. Emp.*

**TITWALLA**, in *Geography*, a town of Hindoostan, in Baglana; 28 miles E. of Basseen.

**TITYRUS MOUNTAINS**, in *Ancient Geography*, a mountain in the western part of the isle of Crete, in the country named Cydonia, according to Strabo. On this mountain was a temple named *Διὸν ἱεῖον* Templum. In some copies of Strabo, this mountain and temple are placed in the town of Cydonia.

**TITZ**, in *Geography*, a town of France, in the department of the Roer; 4 miles N.E. of Juliers.

**TITZLA**, a town of Asiatic Turkey, in Caramania, on a salt lake; 60 miles S.W. of Kirsehr.

**TIVA**, a town of the Arabian Irak; 130 miles W. of Bassorah.

**TIVER**, in *Rural Economy*, the provincial name of a substance of the colouring ochre kind, used for marking sheep in some places.

**TIVERING**, a term applied to the act or operation of marking sheep and lambs in different ways, with the material of the tiver kind, in some districts and places, for particular uses and purposes. Thus, it is a practice with some correct sheep-farmers to have their sheep tivered so as to ascertain different points in their management with great exactness. The bows or breaks of the rams are tivered every two or three days in the tugging or riding season, and the ewes which are put to them, the first week, marked with one stroke of tiver, those of the second week, with two strokes, and so on. The tivering of sheep is also useful on many other occasions for marking and distinguishing the objects and views of the sheep-farmer. The practice of it is very common in the Romney-marsh system of sheep-grazing. See *SHEEP*.

**TIVERTON**, in *Geography*, anciently called *Twyford-town*, a borough and market-town in the hundred of the same name, and county of Devon, England; is situated on the slope of a hill between the rivers Exe and Loman, 14 miles N. by E. from Exeter, and 163 miles W. by S. from London. In the time of Alfred it was only a village, but had twelve tithings belonging to it, and was governed by a portreeve. Henry I. granted the manor and lordship to Richard Rivers, afterwards earl of Devon, by whom a castle was erected here about the year 1106, which continued to be the baronial residence for a considerable number of years. The attractions of the castle occasioned a great increase in the buildings and population of Tiverton; and by the favour of the lords, it was invested with the privilege of a market as early as the year 1200. About fifty years afterwards, the stream of water, now called the Town-Leat, was conducted from the distance of five miles to supply the inhabitants; and a piece of waste land, called Elmore Common, was given for the benefit of the poorer classes, either for pasturage or for cultivation. These advantages continued to attract new settlers; but the most rapid augmentation of the town took place on the final establishment of the woollen manufacture about the year 1500. Towards the close of Elizabeth's reign, Tiverton was the principal place in the county for the manufacture of woollen goods; particularly kerseys, which still continue to be the chief article made here. About this period, the prosperity of the town received a temporary check: in 1591 it was visited by the plague, to which 550 persons fell victims; numbers fled for safety; and the inhabitants were so thinned, that the growing of grass in the streets is particularly recorded. Scarcely had the town recovered, when it was nearly destroyed by fire,

April 3, 1598, when more than four hundred houses were consumed, and thirty-three persons perished in the flames: the value of the property destroyed was estimated at 150,000*l.* In about a dozen years from that time, Tiverton was again esteemed a town of great importance, and called the chief market-town of the West. Many rich clothiers and merchants lived in it, and 8000 people were constantly employed in its woollen manufactures. The buildings were increasing in number and respectability, and Tiverton would have probably become one of the greatest manufacturing towns in the kingdom, but for a second conflagration, which destroyed nearly all the property of the inhabitants, and wholly blasted their flourishing expectation. In this fire, which happened August 5, 1612, six hundred houses were destroyed, with goods and merchandize to the amount of 200,000*l.*; and the inhabitants of every description were reduced to the greatest distress. The poor manufacturers were distributed in different towns, by which means the advantages of the clothing trade that had hitherto been exclusively enjoyed by Tiverton, were extended to other parts of the county. In the year 1615, Tiverton received its first charter of incorporation from King James; and its government was vested in a mayor, twelve capital burgesses, and twelve assistant burgesses. The right of returning two members to parliament was also granted to the same persons. This charter continued in force till 1723, when it was forfeited by neglect, and a new one, exactly similar, was granted by George I. In 1731, a third destructive fire occurred, which again nearly laid waste the town. During the 17th century, the trade and population progressively increased: but in the following century, rapidly declined: a favourable alteration has recently taken place, and the general trade of the town is now on a respectable basis. By the parliamentary return of the year 1811, the number of houses is stated to be 1303, the inhabitants 6732. A weekly market is held on Tuesdays, and two fairs annually. The spot of ground on which Tiverton is built, partakes of a triangular form, from the course of the rivers by which it is bounded. Its greatest length is nearly one mile; its breadth exactly three quarters. The four principal streets form a quadrangle, inclosing an area of gardens, in the centre of which is a bowling-green. Most of the houses are of red brick, or of stone, and are generally covered with blue slate. Those on the outskirts of the town, and at the ends of the streets, which escaped the fire of 1731, are of earth or cobb, covered with thatch. The principal buildings are the castle, the church, and the free grammar-school. The castle, from the present remains, appears to have been nearly of a quadrangular form, inclosing an area of about an acre, and surrounded by strong walls, from twenty to twenty-five feet in height. At the angles were embattled towers, about thirty-five feet high. This fortress was secured from attack on the W. side by a steep declivity of about sixty feet, on the edge of which a lofty wall was built. Two wide and deep moats, filled with water from the Town-Leat, defended the whole of the N. and S. walls to each side of the causeway leading to the gate on the E. This castle has been frequently exposed to sieges: during the reign of Stephen, and in the contest between the houses of York and Lancaster, it was several times subject to the assaults of the contending parties; and in the civil war of Charles I. being garrisoned for the king, it was besieged and taken by the parliamentary forces. From this period the castle has been falling to decay; and several of the ancient buildings have been converted into the offices of a farm. Great part of the S. and W. walls, with parts of the towers at the angles, are still standing. The moat at the S. side is converted into a good kitchen garden;

garden; that on the N. side is filled up, and made part of a court-yard. The church is situated on an eminence, at a short distance from the castle; and though the work of different ages, is more regular than might have been expected. The S. side is ornamented with much curious sculpture. The tower is a plain stone structure, ornamented with battlements and pinnacles: the height is 116 feet. The interior of the church is spacious, and its chancel is separated from the body of the church by a screen, ornamented with elegant tracery. The church being too small for the reception of the inhabitants of the town, a chapel of ease was erected about the year 1733; and here are also several meeting-houses for dissenters of various denominations. A free grammar-school was erected about the year 1604, pursuant to the will of Peter Blundell, a native, and eminent clothier of this town; who, from a very low origin, by a long life of successful industry acquired an ample fortune; and bequeathed 40,000*l.* to various charitable purposes. In this school he provided for the instruction of 150 boys: with maintenance for three scholars in each of the universities of Oxford and Cambridge, to be chosen out of his school. Here are also a charity-school, a free English school, several alms-houses, and other endowments for the benefit of the poor inhabitants. The other public buildings are: the town-house, a spacious edifice, appropriated to the meetings of the corporation, grand juries, and other public bodies; the market-house, a large quadrangular fabric, for the standing and sale of corn; and the hospital or poor-house, an extensive structure, erected in 1704, and containing various workshops for the employment of those whom indigence or misfortune may oblige to have recourse to it. The parish of Tiverton is upwards of nine miles in length, and about eight miles in breadth.

At a short distance to the south of Tiverton is Collipriest House, formerly the seat of the Blundell family, but now the property of Thomas Winslow, esq. who recently rebuilt and enlarged the mansion. It stands on the side of an eminence near the river Exe, having a sloping lawn in front, and a hanging wood behind.—*Historical Memoirs of the Town and Parish of Tiverton, &c.*; by Martin Dunsford, Exeter, 4to. 1790. *Beauties of England and Wales*, vol. iv. Devonshire; by J. Britton and E. W. Brayley, 1803.

TIVERTON, a town of Rhode island, in the county of Newport, containing 2837 inhabitants, situated on the Taunton river; 15 miles S.E. of Providence.

TIUHOLM, a small island of Denmark, in the Cattegat; 4 miles N.N.E. of Fladstrand.

TIVICA, a town of Spain, in Catalonia; 15 miles N.N.E. of Tortosa.

TIVIOT, a river of Scotland, which rises about 12 miles S.W. from Hawick, and runs into the Tweed, at Kelfoe. The valley which it waters is called *Tiviotdale*.

TIUKI-KARAGAN, a cape on the E. side of the Caspian sea; 156 miles S.E. of Astrachan. N. lat. 44° 20'. E. long. 50° 14'.

TIULIT, a town of Africa, in the kingdom of Fez; 12 miles S.W. of Fez.

TIUMEN, a town of Russia, in the government of Tobolsk, at the union of the Pischma and the Tura. This town is not built parallel to the river Tura, but at right angles with it; and the little river Pischma runs through the town, and falls into the Tura at the extremity of it. Over the river is a bridge of eighty-three fathoms in length; and a little below it stands a fort, built with stone, in which is a church of the same materials. Without this fortification, and towards the lower bank of the Tura, are six wooden

churches, a convent of nuns, with a church, and 500 dwelling-houses. At the lower end of the town is an ostrog. Beyond the Tumenka lies the Yamskaia sloboda, or suburb, consisting of 250 houses, inhabited by people of all ranks and professions; and at the extremity of this suburb stands a monastery: it has likewise three churches, built with stone. Another suburb lies opposite to Tiumen, on the N. side of the Tura, which is inhabited by Russians, Mahometan Tartars, and Bucharians; 112 miles W.S.W. of Tobolsk. N. lat. 57°. E. long. 65° 14'.

TIVOLI, anciently called *Tibur*, a town of the Pope-dome, in the Campagna di Roma, situated on a rocky mountain, planted with olive-trees, which are said to yield the best oil in Italy; the see of a bishop held immediately under the pope. The town itself is mean, and contains a great number of forges. The cathedral is built on the ruins of a temple of Hercules. In the market-place are two images of Oriental granite, representing Isis, the Egyptian deity. The principal beauty of this place arises from the river Tevereone, which falling headlong about fifty feet down the rock, forms a noble cascade, and several lesser ones, called *Le Cascadelle*. The latter are extremely picturesque; as is also a deep ravine in the hill, called *La Grotta di Nettuno*, into which the great cascade falls. To enrich the view, here are some remains of ancient buildings, as the villa of Mæcenus, and particularly the little round temple of the Sibyl, as it is commonly called, but rather of Vesta; one of the most elegant remains of the Grecian architecture. The naturalist will here take pleasure in observing the continual formation of new Tiburtine stone from the deposit of water descending from the calcareous Apennines; 15 miles E.N.E. of Rome. N. lat. 41° 58'. E. long. 12° 46'.

TIURANEN, a small island on the E. side of the gulf of Bothnia. N. lat. 65° 38'. E. long. 24° 46'.

TIUTERS, an island of Russia, in the gulf of Finland; 80 miles E.N.E. of Revel. N. lat. 59° 40'. E. long. 27° 14'.

TIVY, a river of South Wales, which rises about 5 miles N. from Tregaron, and runs into the sea about 5 miles below Cardigan.

TIXIER, JOHN, (Lat. *Ravifus Textor*), in *Biography*, a person of literary character in France, was lord of Ravify in the Nivernois, and educated in the college of Navarre at Paris, where he taught the belles-lettres, and whence issued many of his publications for the use of his students. In 1500 he was appointed rector of the university of Paris, and he died, as some say in the hospital, in 1522. His works are, "A Collection of Latin Letters," "Dialogues," "Poems," "Epigrams," "Orations," &c. in Latin, written in good style; "Officina, seu potius Naturæ Historia, &c." several times reprinted; "De Memorabilibus et claris Mulieribus, aliquot diverforum Scriptorum Opera," to which he has annexed the life of Joan of France, written by himself. Moreri.

TIZ, in *Geography*. See TIZZ.

TIZRI, in *Chronology*. See TISRI.

TIZZANO, in *Geography*, a town of the duchy of Parma; 13 miles S. of Parma.

TIZZONAIOS, in the *Glass Art*, are two apertures, one on each side of the working-furnace, by which a servitor night and day puts on coals to maintain the fire,

TLACOOZELOTL, in *Zoology*. See OCELOT.

TLAM, or SLAM, in the *Alum-Works*, a word used by the workmen to express a sort of mud or foulness which does great hurt to the alum, rendering it foul and coarse. The slam is a muddy substance settling to the bottom of

the vessels; but in the boiling of the liquor it gives a reddish colour, and disorders the whole works when in any great quantity. They always pass their liquor over four parcels of the alum-rock, and the last, if not carefully calcined, generally gives it this disadvantageous mixture. Phil. Trans. N<sup>o</sup> 142.

**TLANHQUACHUL**, in *Ornithology*, the name of a Brazilian bird, very much approaching to the nature of the European platea, or spoonbill.

It is a very voracious bird, and feeds on live fish, but will not take or meddle with dead ones, and is all over of a beautiful red. It has a black ring round the upper part of its neck, and is common about the shores of the sea and rivers.

**TLAQUACUM**, in *Zoology*, the name given by the Spaniards, and some others, to a very remarkable animal in America, commonly known among us by the name of the possum or opossum.

**TLAQUATZIN**, a name by which the natives in some parts of America call the opossum.

**TLAQUATZIN** *Spinosum*, the name by which Hernandez has called the cuanda, a sort of Brazilian porcupine.

**TLASCALA**, in *Geography*, a province of North America, in the government of Mexico; bounded on the N. by Guafteca, on the E. by the gulf of Mexico and the province of Guaxaca, on the S. by the Pacific ocean, and on the W. by the province of Mexico Proper; about 320 miles in length, and from 40 to 120 in breadth. The climate, soil, and produce, are much the same with those of Mexico Proper. On the W. side there is a chain of mountains for the space of eighteen leagues, very well cultivated; and on the N. is also a great ridge of mountains, covered with perpetual snow, the neighbourhood of which exposes it to horrid tempests, hurricanes, and frequent inundations, whereby houses, even on the top of eminences, are sometimes endangered. Yet this is allowed to be the most populous country of all America: and this is partly ascribed to its having been originally an ally to Cortez, in the conquest of Mexico, who obtained a grant of it from the emperor Charles VI. also king of Spain, by which it is still exempt from any service or duty whatsoever to that crown, only paying the king of Spain a handful of maize for each head, as an acknowledgment; which inconsiderable parcels were said, upwards of fifty years ago, to make up 13,000 bushels; for it produces so much of the Indian corn, that hence it had the name of Tlascala, that is, the Land of Bread. By this means the towns and villages swarm with Indians. This province was anciently a monarchy, till civil wars arising among the inhabitants, they formed themselves into an aristocracy of many princes, in order to get rid of one. They divided their towns into different districts; each of them nominated one of their chiefs to reside in the court of Tlascala, where they formed a senate, whose resolutions were a law to the whole. Under this form of government they maintained themselves a long while against the kings of Mexico, and continued in it till the reception of the Spaniards under Cortez.

**TLASCALA**, a town of North America, and anciently the capital of a province to which it gives name, situated on a river, which runs into the Pacific ocean. When the Spaniards first arrived here, it is said to have contained 300,000 inhabitants: and Acofta affirms, that it had a market-place large enough to hold 30,000 buyers and sellers; that in the shambles were seldom less than 1500 sheep, 4000 oxen, and 2000 hogs. But matters were so much altered, that Gemelli, who was here in 1698, says it was then become an ordinary village, with a parish-church, in which hangs up a

picture of the ship which brought Cortez to La Vera Cruz. The inhabitants formerly offered up human sacrifices, and when the Spaniards first arrived here, we are told by Diaz del Castillo, that they found wooden cages, in which prisoners were confined to be fattened for victims; 20 miles N. of Puebla de los Angeles. N. lat. 19° 45'. W. long. 98° 30'.

**TLAYOTIC**, in *Natural History*. See COLIC-Stone.

**TLEMSAM**, or **TELESEN**, in *Geography*. See TREMECEN.

**TLETSCHE**, a town of Russia, in the government of Tobolsk, on the Irtysh; 72 miles E.S.E. of Tobolsk.

**TLEUQUECHOLTOTOTL**, in *Ornithology*, the Mexican name of a bird of the wood-pecker kind, described by Nieremberg under the name of the *avis salutiferus*; the feathers of a red crest it carries on its head being supposed a remedy for head-aches.

**TLOS**, in *Ancient Geography*, a town of Asia Minor, in Lycia, at the pass of a mountain, on the side of Cybara, according to Strabo. It is placed by Ptolemy in the number of the interior towns of Lycia, in the vicinity of mount Cragas.—Also, a town of Asia, in Pisidia.

**TLUMACZOW**, in *Geography*, a town of Moravia, in the circle of Hradisch; 15 miles N. of Hradisch.

**TMAIE'**, a town of Egypt; 12 miles S.E. of an-fora.

**TMARUS**, in *Ancient Geography*, a mountain of Epirus, in Thesprotia, at the foot of which was a temple. Strabo. It was also called Tamarus and Tomarus.

**TMATARACAN**, or **TAMATERCAN**, literally denoting the "swarm of beetles," called in Theodosius's Itinerary "Tamatarce," a name anciently given to the city of Taman, over the suburbs of which extend all the ruins of the ancient city of Phanogoria. The distance across the Bosphorus from Tmataracan to Kertchy, *i. e.* from Phanogoria to Panticapæum, is found to correspond with the actual distance from Taman to Kertchy. Among other antiquities of Taman, one of the most remarkable is the Naumachia, or amphitheatre for naval combats, not less than 1000 paces in diameter, with its whole area paved. The subterraneous conduits for conveying water still remain, but are applied to other uses. The materials of the ruined buildings do not exist in the isle of Taman, but must have been brought from the Crimea, from Greece, or in later ages, by the Genoese from Italy. The distance from Taman to Yenikele, on the opposite shore, is about 12 miles. Clarke's Travels, vol. ii.

**TMESCHEDÉ**, or **MUSCHEDÉ**, a town of Germany, in the county of Arensburg, on the left side of the Roer; 3 miles N.W. of Arensburg.

**TMESIPTERIS**, in *Botany*, an uncouth, however learned, name, composed of *τμήσις*, a notch, or incision, and *πτερις*, a fern, because the capsules are seated in the notches of the frond.—Bernhardi in Schrad. Journ. for 1800, 131. t. 2. f. 5. Willd. Sp. Pl. v. 5. 56. Swartz Fil. 187. Labill. Nov. Holl. v. 2. 105. t. 252. This fern is referred by Mr. Brown to *PSILOTUM*. (See that article.) We ought there to have noticed Mr. Brown's remark, that the plant of Forster differs from Labillardiere's, in not having abrupt leaves, and that it was found in New Zealand, not in the isle of Tanna. Willdenow has justly observed the difference between Bernhardi's figure, and that of Labillardiere. Mr. Brown says both these species are parasitical, on the stems of arborecent ferns.

**TMESIS**, *τμήσις*, formed from *τμήσις*, *I cut*, in *Grammar*, a figure by which a compound word is separated into two parts, and one or more words interposed between them.

Thus,

Thus, when Terence says, "quæ meo cunque animo libitum est facere," there is a tmefis; the word *quæcunque* being divided by the interposition of *meo*.

Lucretius abounds in tmefes; as "sæpe salutantum tactu præterque meantum;" or "diffidio potis est sejunggi, seque gregari;" and "dispectis disque gregatis."

**TMOLUS Moxs**, in *Ancient Geography*, a mountain of Asia Minor, in Lydia. Strabo says that the town of Sardis was commanded by the Tmolus, a rich mountain, on the summit of which the Persians had erected a turret, from which might be seen all the adjacent fields, which were watered by the Cnystrus. According to Homer it obtained, from its extraordinary elevation, the name of Ventose, or windy. From Pliny we learn that the Pactolus, Chrysoforrhoas, and the fountain Tarne, had their sources in this mountain, and that it produced excellent wine, highly commended by Pliny and Vitruvius. The summit is represented as always covered with snow. It was sometimes denominated Timolis, as by Ovid,

"Deserere sibi Nymphæ? . . . Timoli."

According to the mythologists, it was in this mountain that Apollo punished Midas, king of Phrygia, by giving him asses' ears.

**TMOLUS**, a town of Asia Minor, in Lydia, on mount Tmolus. According to Tacitus, Tmolus was one of the twelve towns overthrown by an earthquake, in the fifth year of the reign of Tiberius, A.D. 117, and it was rebuilt by this prince.

**TMORUS**, the name of one of the summits of the Ceraunian mountains, in Epirus.

**TMULGA**, in *Geography*, a town of Algiers; 10 miles E. of Sinaab.

**TNYSSUS**, in *Ancient Geography*, a town of Asia Minor, in Caria.

**TOA**, in *Geography*, a river of the island of Porto Rico, which runs into the harbour of Porto Rico.

**TOAD**, *Rubeta*, *Rana Bufo* of Linnæus, in *Zoology*, a creature sufficiently known. See *RANA*.

The toad has been generally considered as a poisonous animal, but Mr. Pennant apprehends without sufficient reason. They have been taken up in the naked hand without the least injury, and quacks have even eaten them, and drank their juices without damage. Besides, they are common food to many animals, as buzzards, owls, Norfolk plovers, ducks, and snakes; of late, indeed, live toads have been applied to cancers, with a view of curing them: facts have been alleged in proof of their efficacy for this purpose. The mode of applying them has been to put the animal into a linen bag, and to hold its head, pressing out of the bag, to the part, which it has soon laid hold of and sucked with greediness till it dropped off dead. The creature has swelled and appeared to be in great pain; often sweats much and turns pale; and sometimes disgorges, recovers, and becomes lively again. For other particulars, we must refer to Mr. Pennant's appendix *ubi infra*. The time when toads propagate is early in the spring; at which season the females are seen crawling about oppressed by the males, who continue on them for some hours, and adhere so fast as to tear the skin from the part to which they stick. They impregnate the spawn as it is drawn out in long strings, like a necklace. And the female is assisted by the male, in discharging the spawn, who with his hinder feet pulls out the eggs, whilst his fore-feet embraces her breast. The eggs are included each in a membranous coat that is very firm, in which is contained the embryo, and these eggs, fastened to one another by a short but strong cord, form a kind of chaplet, the

beads of which are distant from each other about half their length. The male, by drawing this cord with his paw, performs the functions of a midwife, and acquits himself in it, it is said, with a dexterity which could not be expected from so lumpy an animal. Pennant's *Brit. Zool.* vol. iii. p. 14. p. 385, &c.

The toad of Surinam, or *rana pipa* of Linnæus, has long been an object of attention to the curious, on account of its enormous bulk and ugly form. Dr. Fermin, in his "Traité des Maladies les plus fréquentes à Surinam," &c. published at Maastricht in 1764, has given some remarks on its mode of generation. Having put three males and a female into an open vessel of water, he observed that one of them had several spots on its back, which were eggs, each containing an embryo. At the end of three weeks, the animal seemed much agitated, and one of the cells on his back bursting open, a young one crept out of it. In five days no less than thirty-five of these cells opened in the same manner and produced as many animals. On the back of one of these which was dissected, there were no less than one hundred and twenty of these cells, each of which he considers as a real matrix, in which its eggs are lodged and fecundated; and, indeed, in one of them he discovered an embryo completely formed, enveloped in a kind of placenta, accompanied by two thin transparent membranes, seemingly analogous to the chorion and amnios in other animals. For other species of toad, see *RANA*.

**TOAD-Fish**, *Rana piscatrix*, in *Ichthyology*. See *LOPIHUS Piscatrix*, and *SEA-Devil*.

**TOAD-Flax**, in *Botany*. **ANTIRRHINUM**.

**TOAD-Stone**, in *Mineralogy*, a variety of trap-rock. (See *TRAP*.) The toad-stone of Derbyshire is generally a dark-brown basaltic amygdaloid, composed of an intimate intermixture of basalt and green earth, and containing oblong cavities, principally filled with calcareous spar. It sometimes assumes the form and texture of a compact basalt, and is also found in a decomposing soft state, approaching to clay. In composition and appearance it bears a strong resemblance to some volcanic rocks; and there are certain peculiarities in the geological position of this rock, which have excited considerable attention. Mr. Whitehurst, in his *Theory of the Earth*, has given a particular account of the Derbyshire toad-stone; and has stated the number of beds, and the thickness of each, with that of the mountain lime-stone, with which it alternates, as under:

First lime-stone	-	50 yards.
First toad-stone	-	16
Second lime-stone	-	50
Second toad-stone	-	46
Third lime-stone	-	60
Third toad-stone	-	22
Fourth lime-stone	-	not cut through.

It appears, however, that the thickness and extent of the toad-stone beds are by no means so regular as those of the other strata, in the same district.

In some situations, one or more of the beds will become very thin, or be entirely wanting; in other situations, a single bed will be found of vast thickness: and masses of this substance, which cannot be referred to any of the three beds, will be found interposed in the lime-stone strata. In some instances, particularly near Ashover, nodules of lime-stone may be seen imbedded in toad-stone. Farey's *Derbyshire Report*, vol. i. p. 276.

The most remarkable phenomenon which the beds of toad-stone present in Derbyshire, is the complete separation of the metallic veins which they generally occasion. The mountain lime-

lime-stone of that district is intersected by numerous perpendicular metallic veins, which rise from the lowest lime-stone to the uppermost; but on sinking through the vein in the first lime-stone, down to the first toad-stone, the vein will entirely disappear, but on perforating through the toad-stone, it will be found again in the second lime-stone; and the same appearances will be presented on piercing through the second and third beds of lime-stone, and the second and third beds of toad-stone. See *Plate IV. Geology, fig. 1.* where 1, 2, 3, 4, represent the four beds of lime-stone; b, b, b, the three beds of toad-stone; and v, v, v, the metallic vein passing through the different lime-stone beds, but completely cut off or separated by the intervening beds of toad-stone. To account for this interruption of the vein at v, v, v, Mr. Whitehurst supposes that the toad-stone, in a state of igneous fusion, has burst through the lower strata, and has forced itself between the strata of lime-stone by a lateral motion. Were this the case, we must admit that the toad-stone had risen through fissures or dikes, similar to what exist in many of the northern parts of Britain, and are called whin-dikes. The whin-stone, or basalt, bearing a close resemblance to toad-stone, and the strata in the peak of Derbyshire being much fractured, we should feel little difficulty in admitting the probability of Mr. Whitehurst's theory, did it apply to the different phenomena which these beds of toad-stone present. According to this theory, the beds of toad-stone must have been interposed subsequently to the formation of the metallic veins. There are, however, instances, in which very large veins extend from the lime-stone to some depth in the toad-stone, and terminate in small strings of ore; in other instances, though the ore is not continued through the toad-stone, a small vein filled with spar may be traced from No. 1. the first lime-stone, through b, to No. 2. the second lime-stone. Such instances prove, in the most decisive manner, that the formation of the veins was posterior to that of the toad-stone. Hence we are led to seek for some other cause which may explain the absence of metallic ores in the beds of toad-stone. This subject will be considered when we treat of metallic veins. See *TRAP, and VEINS, Mineral and Metallic.*

From the experiments of Dr. Withering on this stone with different acids, alkalies, and by fusion, it appears that one hundred parts of it consist of  $63\frac{1}{2}$  parts of siliceous earth, 16 of calciferous iron,  $7\frac{1}{2}$  of calcareous earth, and  $14\frac{1}{2}$  of earth of alum. The aggregate of these ingredients is found to weigh  $1\frac{1}{2}$  parts more than the original mass, which is ascribed to the substance capable of uniting with fixable air, not having been fully saturated with it, as they would be after their precipitation by the earth of alum. (Phil. Transf. vol. lxxii. part ii. p. 353.) This substance differs little from basalt: it is softer, contains a smaller proportion of iron, and a larger of silica.

**TOAGAMALLY**, in *Geography*, a town of Hindoostan, in the Carnatic; 17 miles W.S.W. of Tritchinopoly.

**TOAHOUTA**, one of the smaller Society islands, near Otaha.

**TOAIREH**, a town of Egypt, on the coast of the Red sea, where the water is salt; 3 miles N. of Kolzum.

**TOALDO, JOSEPH**, in *Biography*, a distinguished philosopher, was born in 1719 at a small village near Marostica, in the valley of Vicenza, at the foot of the Alps, and sent, in the year 1733, to the seminary of Padua, where he studied Latin, rhetoric, philosophy, theology, and particularly mathematics. In this seminary he afterwards became a teacher of grammar, rhetoric, philosophy, and mathematics. His first literary work was a new edition of

the writings of Galileo, to which he added several fragments never before published, with a preface and notes. For his services to the above-mentioned seminary he was recompensed with the benefice of Montegalda, which he enjoyed for 14 years, and which he exchanged for another more convenient, after his appointment by the senate of Venice, in 1762, to the professorship of astronomy and meteorology in the university of Padua. Here he constructed an observatory, begun in 1767 and completed in 1774. In 1769 he published at Padua a short view of plane and spherical trigonometry, entitled "Tavole Trigonometriche, &c." which was reprinted and used in many of the Italian seminaries. He next published a treatise on the influence of the heavenly bodies on the weather and atmosphere, containing the result of a long series of meteorological observations. This work, printed at Padua in 1770, 4to., was translated into different languages, and so well received, that he was admitted into various learned societies. About the same time he presented to the public essays in favour of electrical conductors, which caused them to be erected in the Venetian territories; also a chronological view of uncommon changes in the weather, with tables of the state of the barometer, and the flux and reflux of the sea. His meteorological journal was begun in 1773, and continued till his death. His celebrity was augmented in 1774 by an answer to a prize question, proposed by the academical society of Montpellier, on meteorology applied to agriculture; and after this time he laboured incessantly in diffusing meteorological science. In 1777 he translated Lalande's Astronomical Tables, and his "Abrégé de l'Astronomie;" and some time after, his "Astronomie des Dames;" erecting also in his observatory a marble bust of that eminent astronomer. From this time he almost restricted his attention to astronomy and meteorology, endeavouring to confirm his hypothesis of the influence of the moon on the different changes of the weather. He also published an historical view of the services rendered by the Venetian schools to astronomy, geography, and navigation. In 1783 he obtained, in conjunction with his nephew Chiminello, who was his assistant in the observatory, the prize offered for the best treatise on the construction of a comparative hygrometer; and in 1784 he published a small work on the longitude, which was well received. He proceeded regularly with his journal till the year 1787, when a small work in two sheets was printed at Venice; and in the following year his Tables of Vitality appeared at Venice and Padua. Of his travels in 1780 and in 1788, in the course of which he examined the place where Hannibal crossed the Alps, the result was inserted in his dissertation on the subject, printed in the fourth volume of the Transactions of the Academy of Padua. But our limits will not allow us to give even the titles of the numerous essays and papers which he published on various subjects, relating principally to meteorology. The journals of the period in which he lived contain many curious pieces contributed by this industrious inquirer into the operations and phenomena of nature. Besides his publications, he left in MS. several papers, and particularly observations on the travels of Marco Polo, and on the real epoch of the Chinese wall. The termination of Toaldo's life was accelerated by the chagrin which he felt, in consequence of a fruitless attempt to serve a young man who had been deprived of his office. This irritation affected his health, so that in November, 1797, he was attacked by a nervous affection, which in a few days proved fatal, in the 79th year of his age.

"Toaldo," says his biographer, "was of small stature; but, in general, had an engaging appearance that inspired confidence

confidence and respect. His deportment was easy, and in his conversation, which was lively, he displayed great knowledge, and an extensive acquaintance with various branches of science. Simple in his manners, open and sincere, he indulged only the milder passions; and seemed to have no other ambition than that of being useful. He was steady in his friendship; always ready to do good offices in the most disinterested manner, and indulgent towards every one around him. To the talents of a literary man, he added the virtues of the citizen; and therefore was universally esteemed, but particularly by those who enjoyed his more intimate acquaintance." Phil. Mag.

**TOALLOOR**, in *Geography*, a town of Hindoostan, in Baramaul; 3 miles S.E. of Wombinellore.

**TOAMENSING**, a township of Pennsylvania; 50 miles N. of Philadelphia.—Also, a township of Pennsylvania; 15 miles N. of Philadelphia.

**TOANA**, in *Ancient Geography*, a town of India, on this side of the Ganges, east of this river, among the people called Nanichæ. Ptol.

**TOANI**, a people of Arabia Felix, in the environs of the strait of the Arabic gulf. Pliny.

**TOB**, or **TUBIA**, a country on the other side of Jordan, in the northern part of the tribe of Manasseh. It was the country into which Jephtha retired, as we read in the book of Judges.

**TOBA**, in *Geography*, a small island in the East Indian sea, near the west coast of Aroo. S. lat. 5° 8'. E. long. 135° 9'.

**TOBACCO**, **NICOTIANA**, in *Botany*. See **NICOTIANA**.

**TOBACCO**, *Culture and Preparation of*. See **NICOTIANA**.

**TOBACCO**, *History of*. Tobacco was not known in Europe till after the discovery of America by the Spaniards, and first imported about the year 1560, as some say by sir Francis Drake.

The Americans of the continent call it *petun*, those of the islands *yoli*. The Spaniards, who gave it the name *tobacco*, took it from Tabaco, a province of Yucatan, where they first found it, and first learned its use; or, as some say, it derived its name from the island of Tabago, or Tobago.

The French, at its first introduction among them, gave it various names; as *Nicotiana*, or the *ambassador's herb*, from John Nicot, then ambassador of Francis II. in Portugal; who brought some of it with him from Lisbon, and presented it to a grand prior of the house of Lorraine, and to queen Catherine de Medicis; whence it was also called *queen's herb*, and *grand prior's herb*. They also gave it other names, which are now all reduced to the original name of *tobaco*, or *tobacco*, from *Tabaco*, given it by Hernandez de Toledo, who first sent it into Spain and Portugal.

It appears from Lobel, that this plant was cultivated in Britain before the year 1570; and the introduction of the practice of smoking it in England has been commonly ascribed to sir Walter Raleigh, about the year 1584. The cultivation of it is now common in various parts of the globe; and though prohibited by the laws of this country, the manufacture of it forms no inconsiderable branch of commerce.

Tobacco might be cultivated with advantage through the greater part of Europe; but almost in every part of Europe it has become a principal subject of taxation; and it has been supposed, that it would be more difficult to collect a tax from every farm where this plant might happen to be cultivated, than to levy one upon its importation at the custom-house. The cultivation of tobacco has been, upon

this account, most absurdly, (says Mr. Smith, *Wealth of Nations*;) prohibited through the greater part of Europe, which necessarily gives a sort of monopoly to the countries where it is allowed; and as Virginia and Maryland produce the greatest quantity of it, they share largely, though not without some competitors, in the advantage of this monopoly: the cultivation of it, however, is said to be less profitable than that of sugar. At the time when the author published his work above cited, about ninety-six thousand hogsheds of tobacco were annually purchased in Virginia and Maryland, with a part of the surplus produce of British industry; but the demand of Great Britain does not require, perhaps, more than fourteen thousand. If the remaining eighty-two thousand, therefore, could not be sent abroad and exchanged for something more in demand at home, the importation of them must cease immediately, and with it the productive labour of all those inhabitants of Great Britain, who are at present employed in preparing the goods with which these eighty-two thousand hogsheds are annually purchased. Those goods, which are part of the produce of the land and labour of Great Britain, having no market at home, and being deprived of that which they had abroad, must cease to be produced. The most round-about foreign trade of consumption, therefore, may, upon some occasions, be as necessary for supporting the productive labour of the country, and the value of its annual produce, as the most direct. In order to facilitate the great exportation which was necessary, for getting rid of that which remained after the home consumption, the whole duties were drawn back, provided the exportation took place within three years.

The principal kinds of tobacco imported into England are, as we have already observed, the Maryland, called Oroonoko, and the Virginia-tobacco. The former is not so agreeable to the British taste as the sweet-scented tobacco of the latter country; but the northern nations of Europe are said to like it better.

Besides the tobacco of the West Indies, there are considerable quantities cultivated in the Levant, the coasts of Greece, and the Archipelago, the island of Malta, and Italy. The marks of good twist tobacco are a fine shining cut, an agreeable smell, and that it has been well kept.

In the island of Ceylon, there are two kinds of tobacco cultivated for profit. They call both kinds *dunkol*, which signifies a leaf, the use of which is to be smoked. The one kind they call *hingele dunkol* or *singele dunkol*, for they make no difference between the letter S and H in their pronunciation; the other they call *dunkol kappada*; *kappada* signifies gelding, and is a word of Portuguese origin. This *kappada* tobacco is much stronger and more intoxicating than the other; but both kinds are the produce of the same plant; only the single tobacco has very little care taken of it, being, after the sowing, in a manner left to itself; while the other has great pains bestowed upon it during the whole time of its growth, and till it is fit for use.

Some of the Ceylonesse chew this strong tobacco with their betel; and some, who smoke it alone, use no pipe, but, taking a long leaf of it, they roll it up into a long form, and cover it with the leaf of the wattukan-tree; they then light one end of it, and smoke by the other, till the whole is consumed. Phil. Transf. N<sup>o</sup> 278, p. 1143.

Although in Russia tobacco is not considered as one of the general necessaries of the lower classes of the people, the practice of smoking having been held as a sin to the end of the 17th century; nevertheless the consumption of it is by no means small, and of course the importation always much overbalances the exports. In 1793, the former at St.

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Petersburg alone amounted to upwards of 47,000 rubles; and the latter, from all parts of the empire, barely to 20,000: however, the consumption must have increased, as the exportation in 1768 is stated by Guldenstädt at 21,000, and the whole of the importation at 108,000 rubles. The culture has been profitably carried on, since the year 1763, in various districts of the empire. Most of it is obtained in the Malo-Russian governments, where the cultivation was first encouraged; but it has been much cultivated in other regions, *e. g.* about the Volga and the Samara, and particularly by the Cossacks on the Orenburg and Siberian lines. The greater part of the Russian tobacco is derived from American, and some Turkish and Persian seed. In the generality of the southern governments, these plantations admit of being greatly multiplied. The different sorts of tobacco and snuffs prepared from it, which are now in use, are to be attributed to the difference of the climate and soil in which it grows, and the peculiar mode of managing and manufacturing the plant, rather than to any essential difference in its qualities.

TOBACCO, in the *Materia Medica*, &c. This is a well-known drug of a narcotic quality, which it discovers in all persons, even in small quantity, when first applied to them; and when used in large quantities, its effects have sometimes been more violent, so as to have proved a mortal poison. Besides its narcotic qualities, it possesses also a strongly stimulant power, perhaps, as Dr. Cullen observes, with respect to the whole system, but especially with respect to the stomach and intestines; so as readily, even in no great doses, to prove emetic and purgative.

The leaves of tobacco have a strong disagreeable smell, and a very acrid burning taste: distilled in a retort, without addition, they yield an acrid, empyreumatic, poisonous oil. They give out their acrid matter both to water and spirit, but most perfectly to the latter: the aqueous infusions are of a yellow or brown colour, the spirituous of a deep green. The several sorts of tobacco imported from abroad are stronger in taste than that of our own growth, and the extracts made from them much more fiery, but in less quantity.

Tobacco has been employed, in ordinary use, by snuffing, smoking, and chewing; and these practices have been common for more than 200 years to all Europe, and they have more or less prevailed in other parts of the globe. Like other narcotics, the use of it may be introduced by degrees; and its peculiar effects may hardly at all be manifested; but beyond certain limits, violent effects have been sometimes produced on those who have been accustomed to the use of it. The power of habit is often unequal, even among those who have been addicted to this practice. Dr. Cullen mentions a lady, who had been for more than twenty years accustomed to take snuff at all times of the day; but she found at length that indulging much in the use of snuff before dinner took away her appetite; and in process of time, that a single pinch, taken any time before dinner, pallid her appetite for that meal. But when she abstained from the use of it, her appetite returned; and after dinner, for the rest of the day, she took snuff freely without inconvenience. When snuff, that is, tobacco in powder, is first applied to the nose, it proves a stimulus, and excites sneezing; but by repetition, that effect entirely ceases.

Snuff, when first employed, if it be not taken in small quantity, and if it be not thrown out immediately by sneezing, occasions some giddiness and confusion of head; but these effects do not occur when persons are habituated to the use of it. But such persons, if it be taken beyond the usual quantity, experience the same consequences; and

the effect is manifest, not only on the sensorium, but on other parts of the system, particularly the stomach, occasioning a loss of appetite, and other symptoms of a weakened tone in that organ. Dr. Cullen says, that he has observed several instances of persons who take snuff to excess, suffering from it by a loss of memory, by a fatuity, and by other symptoms of the weakened or senile state of the nervous system, induced before the usual period. He has also found symptoms of dyspepsia, and pains of the stomach, occurring every day, in consequence of excess in the practice of taking snuff. These symptoms have subsided, when the use of snuff has been discontinued. A special effect of snuffing, he says, is its exciting a considerable discharge of mucus from the nose; and there have been several instances of head-aches, tooth-aches, and ophthalmias thus relieved: and when this discharge of mucus is considerable, the ceasing or suppression of it, by abstaining from snuff, is apt to occasion those disorders which it had formerly relieved. Another effect of taking snuff is this, that as a part of the snuff is often carried back into the fauces, so a part of this is carried down into the stomach, and then more certainly produces the above-mentioned dyspeptic symptoms.

Smoking, when first practised, shews very strongly the narcotic, vomiting, and even purging powers of tobacco, and it is very often useful as an anodyne; but by repetition these effects disappear, or only shew themselves when the quantity smoked is beyond what habit had before admitted of; and even in persons much accustomed to it, it may be carried so far as to prove a mortal poison. From much smoking, all the same effects may arise which we said might arise from the excess in snuffing.

With respect to the evacuation of mucus which is produced by snuffing, there are analogous effects produced by smoking, which commonly stimulate the mucous follicles of the mouth and fauces, and particularly the excretories of the salivary glands. By the evacuation from both sources, with the concurrence of the narcotic power, the tooth-ache is often greatly relieved by it; but we have not found the smoking relieve head-aches and ophthalmias so much as snuffing often does. Sometimes smoking dries the mouth and fauces, and occasions a demand for drink; but, as commonly the stimulus it applies to the mucous follicles and salivary glands draws forth their liquids, it occasions on the other hand a frequent spitting.

So far as this is of the proper saliva, it occasions a waste of that liquid so necessary in the business of digestion; and both by this waste, and by the narcotic power at the same time applied, the tone of the stomach is often weakened, and every kind of dyspeptic symptoms is produced. Though in smoking a great part of the smoke is again blown out of the mouth, still a part of it must necessarily pass into the lungs, and its narcotic power applied there often relieves spasmodic asthma; and by its stimulant power it there also sometimes promotes expectoration, and proves useful in the catarrhal or pituitous difficulty of breathing.

Smoking has been frequently mentioned as a means of guarding men against contagion. In the case of the plague, the testimony of Diemerbroeck is very strong; but Rivinus and others give us many facts which contradict this; and Chenot gives a remarkable instance of its inutility. We cannot indeed suppose that tobacco contains an antidote of any contagion, or that in general it has any antiseptic power; and therefore we cannot allow that it has any special use in this case: but it is very probable that this and other narcotics, by diminishing sensibility, may render men less liable to contagion; and by rendering the mind less active and anxious, it may also render men less liable to fear, which

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has so often the power of exciting the activity of the contagion. The antiloimic powers of tobacco are therefore on the same footing with those of wine, brandy, and opium.

The third mode of using tobacco is that of chewing it, when it shews its narcotic qualities as strongly as in any other way of applying it; though the nauseous taste of it commonly prevents its being carried far in the first practice. When the practice, however, is continued, as it is very difficult to avoid some part of it dissolved in the saliva from going down into the stomach, so this, with the nausea excited by the taste, makes vomiting more readily occasioned by this than the other modes of applying it. They are the strong, and even disagreeable impressions repeated, that give the most durable and tenacious habits; and therefore the chewing of tobacco is apt to become one of these: and it is therefore in this way that it is ready to be carried to the greatest excess, and to shew all the effects of the frequent and large use of narcotics. As it commonly produces a considerable evacuation from the mouth and fauces, so it is the most powerful in relieving the rheumatic affection of tooth-ache. This practice is also the occasion of the greatest waste of saliva; and the effects of this in weakening digestion, and perhaps from thence especially, its noted effect of producing emaciation, may appear.

The effects already recited of the different modes of employing tobacco depend especially upon its narcotic power, and certain circumstances accidentally attending its application to the nose and mouth: but as we have observed before, that beside its narcotic, it possesses also a stimulant power, particularly with respect to the alimentary canal: by this it is frequently employed as a medicine for exciting either vomiting or purging, which it does as it happens to be more immediately applied to the stomach or to the intestines.

An infusion of from half a drachm to a drachm of the dried leaves, or of these as they are commonly prepared for chewing, for an hour or two, in four ounces of boiling water, affords an emetic which has been employed by some practitioners, but more commonly by the vulgar only. As it has no peculiar qualities as an emetic, and its operation is commonly attended with severe sickness, it has not been, nor is it likely ever to come into common practice with physicians.

By long boiling in water, its deleterious power is said to be abated, and at length destroyed: an extract made by long coction, is recommended by Stahl and other German physicians, as the most effectual and safe aperient, detergent, expectorant, diuretic, &c.; but the medicine must necessarily be precarious in strength, and has never come into use among us. Lewis Mat. Med.

It is more commonly employed as a purgative in glysters; and, as generally very effectual, it is employed in all cases of more obstinate costiveness; and its powers have been celebrated by many authors. Dr. Cullen has known it to be in frequent use with some practitioners: and he adds, it is indeed a very effectual medicine, but attended with this inconvenience, that when the dose happens to be in any excess, it occasions severe sickness at the stomach, and it has been known to frequently occasion vomiting.

A strong decoction of tobacco, with proper carminatives and cathartics, given glyster-wise, sometimes proves of good effect in what is usually called the stone colic, and also in the iliac passion.

It is well known, that in cases of obstinate costiveness, in ileus and incarcerated hernia, the smoke of burning tobacco has been thrown into the anus with great advantage. The smoke operates here by the same qualities that are in the infusions of it above-mentioned: but as the smoke reaches

much farther into the intestines than injections can commonly do, it is thereby applied to a larger surface, and may therefore be a more powerful medicine than the infusions. In several instances, however, says Dr. Cullen, I have been disappointed of its effects, and have been obliged to have recourse to other means.

Bates and Fuller give some receipts, in which tobacco is an ingredient, with mighty encomiums, in asthmatic cases.

Hoffman observes, that horses have been often relieved by this remedy, but in human subjects it has been rarely tried; and says he has known some of the common people, who laboured under excruciating pains of the intestines, freed in an instant from all pain by swallowing the smoke. Both the decoction and the smoke have not unfrequently been injected in cases of incarcerated hernia, and often with success. The smoke thus applied is recommended as one of the principal means for the revival of persons apparently dead from drowning or other sudden causes; but some suspect the narcotic power of tobacco as unfavourable in these cases.

The infusion of tobacco, when it is carried into the blood-vessels, has sometimes shewn its stimulant powers exerted in the kidneys; and very lately we have had it recommended to us as a powerful diuretic of great service in dropsy. Upon the faith of these recommendations we have now employed this remedy in various cases of dropsy, but with very little success. From the small doses that are proper to begin with, we have hardly observed any diuretic effects; and though from larger doses they have in some measure appeared, we have seldom found them considerable: and when, to obtain these in a greater degree, we have gone on increasing the dose, we have been constantly restrained by the severe sickness at stomach, and even vomiting, which they occasioned: so that we have not yet learned the administration of this remedy, so as to render it a certain or convenient remedy in any cases of dropsy.

Tobacco is sometimes employed externally in unguents and lotions, for cleansing foul ulcers, destroying cutaneous insects, and other like purposes: it appears to be destructive to almost all kinds of insects, to those produced on vegetables as well as on animals. Lewis.

A strong decoction of the stalks, with sharp-pointed dock, and alum, is said to be of good service, used externally, in cutaneous distempers, especially the itch: some boil them for that purpose in urine. The same decoction is said to be infallible in curing the mange in dogs.

Tobacco beat into a mash with vinegar or brandy, and laid on the stomach, has sometimes good effects in removing hard tumours of the hypochondria. We have the history of two cures made by such applications in the Med. Ess. Edinb. vol. ii. p. 41.

The juice of this plant is said to be good against ulcers and mortifications. Boyle's Works, Abr. vol. i. p. 56.

Some caution, however, Dr. Lewis observes, is requisite even in the external uses of tobacco, particularly in solutions of continuity: there are instances of its being thus transmitted into the blood, so as to produce violent effects.

A drop or two of the chemical oil of tobacco being put on the tongue of a cat, produces violent convulsions, and death itself in the space of a minute; yet the same oil used in lint, and applied to the teeth, has been found of service in the tooth-ache; though it must be to those that have been used to the taking of tobacco, otherwise great sickness, retching, vomiting, &c. happen; and even in no case is the internal use of it warranted by ordinary practice. See experiments on the effects of oil of tobacco on pigeons, by M. Fontana, in which he found vomiting to be a constant effect of this poison, as he calls it, and the loss of motion

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in the part to which it is applied an occasional or accidental effect, in Phil. Trans. vol. lxx. part i. append. p. 38, or Fontana sur les Poisons, &c. Florence, quarto.

In cases of obstinate ulcers, the infusion has been employed as a lotion with advantage; but the many instances of its being absorbed, and thus proving a violent poison, dissuade from the practice; especially as there are other medicines of greater efficacy, that may be used more safely. Bergius recommends it to be employed as a fomentation in the paraphymosis.

Sim. Paulli, physician to the king of Denmark, in an express treatise on tobacco, observes, that the merchants frequently lay it in bog-houses, to the end that, becoming impregnated with the volatile salt of the excrements, it may be rendered the brisker, more fetid, and stronger.

Amurath IV. emperor of the Turks, the grand duke of Muscovy, and the emperor of Persia, have prohibited the use of tobacco in their states. Our king James I. wrote a treatise expressly against it, entitled "A Counterblast to Tobacco." By a bull of pope Urban VIII. such are excommunicated as take tobacco in churches.

**TOBACCO, Laws and Regulations concerning.**—Tobacco is not to be planted in England, on forfeiture of 40s. for every rod of ground thus planted; but this shall not extend to hinder the planting of tobacco in physic gardens, in quantities not exceeding half a pole of ground, and also on forfeiture of 10*l.* for every rod. (15 Car. II. c. 7. 12 Car. II. c. 34.) And justices of peace have power to issue warrants to constables, to search after and examine whether any tobacco be sown or planted, and to destroy the same, which they are to do under penalties, &c. 22 & 23 Car. II. c. 26. 5 Geo. c. 11.

The act of 29 Geo. III. c. 68. regulating the importation, exportation, and manufacture of tobacco and snuff, and also that of 30 Geo. III. c. 40. made to explain and amend the former, are so extended, and comprehend so great a variety of particular regulations, as not to admit of minute recital in this place. The former repeals a considerable number of preceding statutes. By 49 Geo. III. c. 68. and c. 69. all duties under the respective departments of Customs and Excise are repealed, and other duties are granted in lieu of them. Tobacco and snuff are also subject to annual duties by the act for continuing the duties on pensions, offices, &c.; and certain drawbacks are allowed upon the exportation of them: which duties are to be under the management of the commissioners of the customs and excise. 43 Geo. III. c. 68. and c. 69.

No tobacco shall be imported but from America, on pain of forfeiture, with the vessel and its contents; except from Spain, Portugal, and Ireland, from which it may be imported under certain regulations. (29 Geo. III. c. 68.) But tobacco of the territories of Russia or Turkey may be imported from thence in British-built ships, and warehoused, and may be exported or entered for home consumption, on payment of the like duties as tobacco of the United States of America; and on its being manufactured in Great Britain and exported shall be entitled to the drawbacks. (43 Geo. III. c. 68.) By 45 Geo. III. c. 57. tobacco, the production of the West Indies or the continent of America, belonging to any foreign European state, may be imported into certain ports specified in the act, and exported to any port of the united kingdom, subject to the regulations of the act; and such tobacco shall pay the same duties as that which is the growth of the British West Indies, or of the United States of America. By 49 Geo. III. c. 25. unmanufactured tobacco may be imported from any place in British vessels navigated according

to law, or in foreign ships navigated in any manner whatever belonging to any states in amity with Great Britain; and such tobacco shall be liable to the same regulations as tobacco from the British plantations.

But no tobacco or snuff shall be imported in any vessel or less burthen than 120 tons; nor any tobacco-stalks, tobacco-stalk flour, or snuff-work, in any vessel whatever; nor any tobacco or snuff in casks less than 450*lbs.* on the like penalty; except loose tobacco for the crew, not exceeding 5*lbs.* for each person; nor shall the vessel be forfeited, if proof be made from the smallness of the quantity that such tobacco or snuff was on board without the knowledge of the owner or master. 29 Geo. III. c. 68.

And no tobacco or snuff shall be imported except at London, Bristol, Liverpool, Lancaster, Cowes, Falmouth, Whitehaven, and Hull (and by 31 Geo. III. c. 47. Newcastle-upon-Tyne); on the like forfeiture.

Every manufacturer of tobacco or snuff shall take out a licence from the officers of excise, for which he shall pay, if the quantity of tobacco and snuff-work, weighed by him for manufacture within the year, ending the 10th of October previous to his taking out such licence, did not exceed - - - - - 20,000*lbs.*

	£	s.	d.
If above 20,000 and not exceeding 30,000	2	0	0
30,000 - - - - - 40,000	3	0	0
40,000 - - - - - 50,000	4	0	0
50,000 - - - - - 60,000	5	0	0
60,000 - - - - - 70,000	6	0	0
70,000 - - - - - 80,000	7	0	0
80,000 - - - - - 90,000	8	0	0
90,000 - - - - - 100,000	9	0	0
100,000 - - - - - 120,000	10	0	0
120,000 - - - - - 150,000	12	0	0
150,000 - - - - - -	15	0	0
	20	0	0

Every person who shall first become a manufacturer of tobacco or snuff, shall pay for every such licence 2*l.*, and within ten days after the 10th of October next after taking out such licence, such further additional sum, as with the said 2*l.* shall amount to the duty herein before directed to be paid, according to the quantity of tobacco and snuff-work weighed for manufacture within the preceding year - - - - - 2 0 0

and a surcharge.

And every dealer in tobacco and snuff shall take out a licence in like manner, for which he shall pay, within the liberties of the chief office in London, 5*s.*, elsewhere 2*s.* 6*d.* 43 Geo. III. c. 69. Sched. (A.)

But persons licensed as manufacturers, who shall not sell tobacco in a less quantity than four pounds, nor snuff in two pounds, need not be licensed as dealers. 29 Geo. III. c. 68.

Every person who shall manufacture or deal in tobacco or snuff without taking out such licence; or shall not renew the same ten days at least before the end of the year, shall forfeit, if a manufacturer, 200*l.*, and if a dealer, 50*l.*

But no person shall be liable to the said penalty of 50*l.* for selling unmanufactured tobacco or snuff, whilst remaining in the king's warehouse.

But persons in partnership need not take out more than one licence for one house.

Every person who shall manufacture tobacco, tobacco-stalks, or returns of tobacco, or flatten any tobacco-stalks,

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or cut the same into Spanish, shall be deemed a manufacturer of tobacco. And every person who shall grind or manufacture any tobacco-stalk flour, snuff-work or snuff, shall be deemed a manufacturer of snuff. And every person who shall sell any tobacco, tobacco-stalks, or returns of tobacco, or stalks flattened or cut into Spanish, shall be deemed a dealer in tobacco. And every person who shall sell any tobacco-stalk flour, snuff-work or snuff, shall be deemed a dealer in snuff, within the meaning of this act.

Every manufacturer and dealer shall make entry in writing of his house or place intended to be made use of for manufacturing, keeping, or felling tobacco or snuff, three days before he shall begin, on pain of forfeiting 20*l.*, and also the tobacco and snuff there found, together with the casks and package, which may be seized by the officers of the customs or excise.

Every manufacturer, within the limits of the head office, must be an occupier of a tenement of 10*l.* a-year, and pay to the parish rates; elsewhere, he must pay to the church and poor.

Every such manufacturer shall, three days before he begins, make entry in writing at the excise-office of all mills, presses, engines, rollers, stoves, mullers, or spinning-wheels, intended to be used by him about the manufacturing of tobacco or snuff; on pain of forfeiting 50*l.* for every such utensil not entered.

Every such manufacturer and dealer shall cause to be put up in large legible characters over his door, or on some conspicuous part of such house or place, the words *Manufacturer of, and Dealer in Tobacco and Snuff, or Tobacco or Snuff, or Manufacturer of, or Dealer in Tobacco and Snuff, or Tobacco or Snuff* (as the case may be); on the penalty of 50*l.*

If any person, who has not made such entry as aforesaid, shall put up the said words, he shall forfeit 100*l.*

And by 30 Geo. III. c. 40. no person shall set up or begin any manufactory of tobacco or snuff within five miles of the sea-coast, except in the ports and places aforesaid, where tobacco may be imported, or places within three miles thereof; or in cities, or the suburbs thereof, and market-towns; and no entry thereof shall be of any avail. But the same shall not extend to places duly entered before the 5th of July, 1789.

But tobacco and snuff may be manufactured by any unlicensed Spanish cutter or snuff-miller at any entered mill, on account of any licensed manufacturer, provided the same be legally permitted from such manufacturer, and for the sole purpose of manufacturing or grinding. 29 Geo. III. c. 68.

Every manufacturer shall give notice in writing to the officers (if in London six, in cities and market-towns twelve, and elsewhere twenty-four hours), before he shall begin to strip, spin, or press any tobacco for cutting; or make any tobacco into carrots, or flatten any stalks for Spanish; and shall express therein the weight of each article, and the time he intends to begin: and the officer shall attend accordingly, and he shall begin within one hour of the time so mentioned, and shall proceed without delay; and shall afterwards deliver a declaration in writing to such officer, of the quantity intended to be used for each sort of tobacco; on the penalty of 20*l.* and such notice being void. 30 Geo. III. c. 40.

Provided, that if such tobacco shall afterwards appear to be unfit for the purpose specified in such declaration, it may be applied to any other purpose, on giving 48 hours' notice to the officer of the sort it is intended for. 29 Geo. III. c. 68.

Such manufacturer, as soon as the manufacturing is finished, shall deliver to the officer a declaration of the weight of the different sorts of tobacco so manufactured, and the number of the rolls or carrots made, and the weight thereof, and of the tobacco-stalks and returns arising from the operation; and shall keep each sort separate for twenty-four hours, or until an account be taken; on the penalty of 50*l.*

If any manufacturer shall make, or have in his possession, any roll or carrot tobacco for exportation, which shall have any tobacco-stalks therein, the same shall be forfeited, and may be seized, and he shall also forfeit 50*l.*

Every person who shall cut any walnut-tree, or other leaves, herbs, or plants, in imitation of tobacco (not being tobacco-leaves or plants); or shall colour the same so as to resemble tobacco; or shall mix any such leaves, herbs, or plants with tobacco; or shall sell, or expose to sale, or have in his possession any such leaves, herbs, or plants so cut, coloured, or mixed, shall forfeit the same with the casks and package, which may be seized; and also 200*l.*

Provided, that nothing herein shall extend to prohibit any such manufacturer from dyeing tobacco, or for having such dye in his possession for that purpose. 30 Geo. III. c. 40.

Every manufacturer of snuff shall provide proper moveable casks for preparing, laying down, or putting into bins snuff-work and tobacco-stalks for flour; and shall place them so as that the officer may conveniently examine and weigh the same at all times; and shall mark every such cask with a progressive number, and the tare and weight thereof; and shall not lay down any snuff-work in any cask not so marked; nor put the same in any bin; on the penalty of 50*l.* 29 Geo. III. c. 68.

Such manufacturer of snuff shall, before he begins to liquor, or cut any tobacco or stalks, &c. or to lay down any snuff-work, give like notice as aforesaid to the officer, and shall in such notice declare the weights thereof respectively, and the number of each particular cask or bin in which the same is intended to be laid down; and such officer shall attend accordingly; and such person shall begin within one hour of the time so mentioned, and shall without delay proceed therein, until the whole is weighed; and shall then deliver an account in writing of the quantity intended for each sort of snuff or flour; and when put into casks, he shall give a like notice, and in the presence of the officer shall affix to each cask a ticket specifying the number of such cask, and the weight of the snuff-work, &c. therein, and the time when laid down, and what sort of snuff it is intended for; which ticket shall be signed both by such manufacturer or his servant and the officer; and when the same is intended to be taken out to be ground, like notice shall be given, and the same shall be weighed out in the presence of the officer. And no such manufacturer shall mix snuff-work or tobacco-stalks for flour of one making with another; on pain of forfeiting for every offence aforesaid 50*l.*

Provided always, that if such snuff-work shall afterwards appear to be unfit for the purposes specified in such declaration, or be intended to be manufactured contrary thereto, notice thereof in writing shall be given to the officer within forty-eight hours after the delivery of such declaration, and a fresh declaration shall be given, specifying the sort it is intended for, and such manufacturer shall proceed therein in manner as aforesaid. 30 Geo. III. c. 40.

Scotch snuff and tobacco-stalk flour may be manufactured into brown Scotch snuff, and tobacco-stalk flour into rappee snuff, subject to the regulations aforesaid. And on taking stock,

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stock, certain credits shall be allowed, as set forth in the act; and if on taking such stock any excess be found, the same shall be forfeited, and may be seized. 30 Geo. III. c. 40.

And to snuff-work in operation, tobacco, tobacco-stalks, or flour, or returns of tobacco, may be added, on giving to the officer, previous to such increase being made a like notice, and conforming to the regulations specified in the act.

The whole of any parcel of snuff-work in cure, may be mixed with the whole of any other parcel in cure, although laid down at different times, if the same be mixed in the presence of an officer, to whom notice is to be given as aforesaid.

If any manufacturer has occasion to supply his customers with manufactured tobacco or snuff from any parcel in operation, before the whole is finished, he may, in the presence of an officer, take for the purpose aforesaid any manufactured tobacco or snuff not less than 200lbs. But if taken without conforming to the regulations specified in the act, he shall forfeit 50l.

And every manufacturer shall diligently manufacture such snuff-work, and stalks for flour, when taken out of such cask, according to the notice given; and when the same is finished, he shall deliver to the officer a declaration in writing of the weight of each sort so made, and shall keep the same separate for twenty-four hours, or until the officer shall have taken an account thereof; on the penalty of 50l. 29 Geo. III. c. 68.

Every manufacturer may have a store-room for keeping dried Scotch snuff, but the same shall have but one door or opening, which shall be locked up, sealed, and secured by the officer; wherein may be deposited Scotch snuff returned directly from the mill for six months, without being taken as part of his stock. And when the same is intended to be taken out of such room, notice shall be given to the officer, who shall attend and open such room, and such snuff shall be taken out in his presence; and shall be kept separate one making from another; on the penalty of 50l. And if any such manufacturer shall open such store-room, except in the presence of an officer, he shall forfeit 200l.

Every person, who shall cut any walnut, hop, sycamore, or other leaves, or any other herbs, plants, or materials (not being tobacco-leaves or plants); or shall colour or cure any such, to make the same resemble tobacco; or shall sell the same, mixed or unmixed, for tobacco;—shall forfeit 5s. a pound, half to the king (charges of the prosecution first deducted), and half with full costs to him who shall sue. 1 Geo. I. st. 2. c. 46.

Every person who shall make, mix, or colour any snuff with ochre, amber, or other colouring, except water tinged with Venetian red only; or shall mix with snuff any fustic or yellow ebony, touchwood, or other wood, or any dirt, sand, or small tobacco sifted from tobacco,—shall forfeit the same, and 3l. for every pound weight, half to the king, and half to him that shall sue. 1 Geo. I. st. 2. c. 46. 5 Geo. I. c. 11.

And all such leaves and other materials, and all engines, utensils, and tools for working the same, may be searched for and seized, by warrant of three commissioners of the treasury or of the customs. 1 Geo. I. st. 2. c. 46.

If any person shall mix any fustic, or other wood, or any leaves, herbs, or plants (other than tobacco), or any earth, clay, or tobacco-sand, with any snuff-work or snuff; or shall colour the same with any sort of colouring (water tinged with colour only excepted); he shall forfeit 200l. And if any manufacturer or dealer in snuff shall sell, or ex-

pose to sale, or have in his entered premises, any fustic, yellow ebony, touchwood, logwood, red or Guinea wood, Braziletto or Jamaica wood, Nicaragua wood, or Saunders wood; or any walnut-tree, hop, or sycamore-leaves; or shall have in his possession any of the aforesaid articles; or any other wood, leaves, herbs, plants, earth, clay, or tobacco-sand, mixed with any snuff-work or snuff; or such snuff-work or snuff-coloured (except as aforesaid); he shall forfeit 50l., and the same shall be forfeited, and may be seized. 29 Geo. III. c. 68.

Any manufacturer of British rappee, Scotch or brown Scotch snuff completely finished, and of which an account has been taken by the officer, may liquor the same, before mixing with snuff of a different making, so as it exceed not the legal credit. And if such manufacturer shall intend to liquor snuff, for which the legal credit has not been received, he shall give notice thereof to the officer. But no snuff shall be liquored in less parcels than 200lbs., nor in more than four different parcels of one making. 30 Geo. III. c. 40.

Snuff, for which such allowance shall have been made, shall be kept separate from all other snuff, and shall be shewn to the officer on demand; on the penalty of 20l.

Every manufacturer and dealer, who shall mix Spanish with short cut tobacco, or any tobacco-stalk flour with snuff, or snuff of different sorts the one with the other, shall every day enter in a book or paper, the quantity sold, sent out, or consumed of two pounds or upwards, and the gross weight thereof, and the time when mixed; on pain of forfeiting 50l. 29 Geo. III. c. 68.

When any officer shall discover that the manufacturing of tobacco or snuff is carried on in any unentered place, and that any person knowingly assists, or is in any ways concerned in carrying on the same, every such person shall forfeit 30l. over and above all penalties and forfeitures that the proprietor thereof shall be liable to; and such officer or his assistant, may stop and arrest such person, and convey him before a justice, who, on his confession, or the oath of one witness, may convict such person so discovered, who shall immediately pay the said penalty to such officer or person who brought him; and if not so paid, such justice shall commit him to the house of correction to hard labour for six months from the day of conviction, or until the said penalty be paid. And for a second offence, he shall forfeit 60l., which, if not paid in manner aforesaid, he shall be committed in like manner for one year, or until such penalty be paid.

The officers of excise (between five in the morning and eleven in the evening without a constable, and between eleven in the evening and five in the morning with a constable) may enter into any house or place belonging to or made use of by any manufacturer or dealer, and take an account of the stock found therein; and shall give credit (as particularly set forth in the act). And if at any time any excess in stock shall be found, of which no notice has been given to the officer, unless received by permit, the same shall be deemed and taken to be brought in without permit.

Every manufacturer and dealer shall keep sufficient scales and weights for the use of the officers, on the penalty of 100l. And if any such person shall, in weighing, use any art or device to prevent such officer from taking a true weight of such tobacco, &c. he shall forfeit 200l. together with such scales and weights, which may be seized.

And every such manufacturer and dealer shall with a sufficient number of his servants assist such officer in taking such account of stock, on pain of forfeiting 50l.

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But no officer shall weigh any tobacco, tobacco-stalks, or snuff-work, whilst actually in the operation of manufacture; except snuff-work intended to be sent out or received by permit.

And unmanufactured tobacco, tobacco in the state of operation, and manufactured tobacco, shall be kept separate from each other; on the penalty of 50*l*.

The officers shall be permitted to take samples of tobacco or snuff, &c. in the possession of any manufacturer or dealer, paying for the same (if demanded) the value or usual price; on the penalty of 100*l*. upon refusal.

Every manufacturer and dealer shall, in a book or paper, to be furnished by the officers, keep an account of all tobacco, &c. and snuffs which he shall have sold, sent out, or consumed the preceding day, in quantities of 4*lbs*. or upwards, of tobacco, &c. and 2*lbs*. or upwards of snuffs; and also another book or paper in like manner, if under 4*lbs*. of tobacco, &c. or 2*lbs*. of snuffs. But no such person shall have more than one such book or paper of each sort at the same time, which is to be returned to the officer, if in London, or any city or market-town every six weeks, elsewhere every six months, or when the same is filled up or demanded; and shall be verified on oath. And such books and papers shall lie open for the inspection of the officer, and shall be made up at his request; on the penalty of 100*l*. for every offence.

If any officer shall discover any increase in stock not legally accounted for, the same shall be deemed and taken to be made by a commodity, for which no duty has been paid, and privately brought in without permit; and such increase shall be forfeited, and may be seized; and the person, in whose stock such increase shall be found, shall also forfeit 20*l*.

But Scotch snuff, in the custody of a manufacturer or dealer, not having gained more than 5*lbs*. in the 100*lbs*. by the moisture of the air, shall be deemed a fair commodity, and such person shall have credit for the same in his stock, and may remove the same by permit. And such snuff shall be kept separate from all other snuff, and shewn to the officer upon demand; on the penalty of 20*l*.

If any manufacturer shall remove any tobacco or snuff out of his entered house or place, before the same has been weighed, and taken an account of by the officer, or shall hide or conceal the same from the view of such officer; he shall forfeit 50*l*.

And no tobacco (except returns) of 4*lbs*. and upwards, nor snuff of 2*lbs*. and upwards, nor any tobacco-stalks, Spanish returns of tobacco, tobacco-stalks for flour, snuff-work, or tobacco-stalk flour, exceeding 200*lbs*. shall be removed by land or water without a permit, on pain of forfeiting the same, with the casks and package, and also the horses, cattle, boats, barges, and carriages used in conveying the same, which may be seized.

Such officer on request shall grant permits, wherein shall be limited the time for such removal; and if the goods permitted shall not be delivered within the time so limited, the same shall be deemed and taken to be removed without permit.

But no permit shall be granted or be valid for the removal of any snuff-work from one part of the kingdom to another except from the entered premises of a manufacturer of snuff, where the same was laid down to the mill for the purpose of grinding; on forfeiture thereof, together with the horses, cattle, boats, barges, and carriages, which may be seized. 30 Geo. III. c. 40.

And no such permit shall be granted or be valid, unless the request note from such manufacturer or dealer contain

the particulars specified in the act, and such permit to correspond with the request note; and if for removing unmanufactured tobacco (other than samples), except the same be in the original package, and be removed according to the regulations specified in the act: and all tobacco, &c. removed contrary thereto shall be forfeited, together with the casks and package, and the horses, cattle, boats, barges, and carriages used in the removal thereof, which may be seized. 29 Geo. III. c. 68.

Provided always, that permits may be granted for the removal of any unmanufactured tobacco, in any quantity not less than 200*lbs*. in any package whatsoever, from the entered premises of any manufacturer to any mill to be manufactured, and back to such entered premises. 30 Geo. III. c. 40.

And every manufacturer of tobacco or snuff may manufacture their tobacco, tobacco-stalks, snuff-work, and returns of tobacco, at any entered mill, and may remove the same by permit to and from such mill.

Provided, that nothing herein shall extend to prevent any manufacturer from ~~stoving or finishing~~ drying tobacco, or drying snuff-work at any mill, provided the officer be allowed to weigh and take an account thereof. 29 Geo. III. c. 68.

Where any permit shall be granted for the removal of any tobacco or snuff, &c. and the same shall not be removed agreeable thereto, such permit shall be returned before the expiration of the time limited for such removal; on forfeiture of treble the value of such goods. And where such permit shall not be so returned as aforesaid, and on taking stock a decrease does not appear to answer the contents of such permit, a like quantity shall be forfeited, and may be seized.

No manufacturer, unless licensed as a dealer, shall have a permit for, or shall sell or send out, any manufactured tobacco, Spanish, or returns of tobacco, in a less quantity than 4*lbs*., nor snuff than 2*lbs*.; on the penalty of 20*l*.

No tobacco, &c. or snuff, &c. shall be brought into any house or place of a manufacturer or dealer without a permit, and also notice thereof shall be given to the officer; on pain of forfeiting the same, together with the casks and package, which may be seized, and such manufacturer or dealer shall also forfeit treble the value thereof.

No tobacco or snuff, &c. shall be removed from any place without the limits of the bills of mortality or excise-office in London, to any place within those limits; nor from any place without the limits of the ports herein before enumerated to any place within, or within two miles of those limits; on forfeiture thereof, with the casks and package, and also the vessels, horses, cattle, and carriages employed in removing the same, which may be seized. But the same shall not extend to the legal removal of the several articles specified in the act.

By 30 Geo. III. c. 40. tobacco-stalks stripped from the leaf may be removed, by permit, from any entered premises out of the limits of the bills of mortality, to any place within those limits, subject to the regulations in the aforesaid act, and this act specified.

Any manufacturer or dealer, who hath received into his stock, by permit, any tobacco or snuff, may return the same within forty-eight hours to the person from whom he received it under certain regulations. But if found returned, or returning without permit, or shall not be the same identical tobacco or snuff which had been received, without any alteration; the same shall be forfeited, with the casks and package, which may be seized, and the person who shall return the same shall also forfeit 50*l*. 29 Geo. III. c. 68.

If any tobacco of 4lbs. or upwards, or snuff of 2lbs. or upwards, or any tobacco-stalks, &c. shall be found removing, unless between seven in the morning and five in the evening from 29th Sept. to 25th March, and between five in the morning and seven in the evening from 25th March to 29th Sept. (except by a common carrier or vessel which usually goes out of these hours,) the same shall be forfeited, with the casks and package, and the horses, carriages, and vessels made use of in conveying the same, which may be seized, whether the same be accompanied with a permit or not.

If any person whatsoever without a permit, or hawkers with one, shall offer any tobacco, &c. to sale, he shall forfeit the same, together with the package, and also 20*l*. And the person to whom it shall be so offered to sale, may seize the same, and carry it to the next warehouse belonging to the customs or excise, and shall bring the person so offering it to sale before a justice, who shall commit him to prison, that he may be prosecuted for such penalty; and the person so seizing the same shall be entitled to the same rewards as the officers of the customs or excise, and in case such person shall desire it, the commissioners may cause three-pence for every pound of tobacco, &c. so seized to be paid to him, till the same can be disposed of, upon a certificate under the hand and seal of such justice, of such offender being committed to prison; and after sale, the money so advanced shall be replaced out of the produce of such sale.

If any person shall counterfeit or forge any permit, he shall forfeit 500*l*.

If any person shall assault, resist, oppose, molest, obstruct, or hinder any officer in the due execution of this or any other act; or shall rescue any goods which have been seized; or any vessel, horses, cattle, or carriages, which have been forfeited, and for which no particular penalty is provided; he shall forfeit 200*l*.

If any person shall give or offer any bribe, recompence, or reward to any officer to prevent him doing his duty, whether the same be accepted or not, he shall forfeit 500*l*.

No tobacco, snuff, &c. shall be landed, without first making entry thereof with the officers of the customs, on forfeiture thereof, with the casks and package.

If any officer of excise shall have cause to suspect that any tobacco, &c. or snuff, which shall have been imported contrary to this act, or forfeited by this or any other act, is deposited, lodged, hid, or concealed, if within London or Westminster, or the limits of the chief office, upon oath made before two commissioners, elsewhere upon oath made before one justice setting forth the ground of his suspicion, such commissioners or justice may, by warrant, authorize such officer by day or night, but if in the night, in the presence of a constable, to enter into such suspected place, and to seize and carry away all such tobacco, &c. or snuff which shall be there found, together with the casks and package containing the same. And if any person shall obstruct or hinder any such officer so authorized, or person assisting him in the execution of such warrant, he shall forfeit 100*l*.

Tobacco and snuff, taken as prize, are subjected to the regulations of this act, by 43 Geo. III. c. 134.

No manufacturer or dealer in tobacco or snuff, or person anywise interested or concerned therein, shall act as a magistrate in the execution of any act relating to tobacco or snuff; and all acts done by such person shall be utterly null and void.

If any tobacco-stalks or stems stripped from the leaf shall be imported, the same shall be forfeited and burned, and

the officer seizing the same shall be allowed one penny a pound; and every person, who shall be assisting or otherwise concerned in unshipping the same, or to whose hands they shall knowingly come after unshipping, shall forfeit treble value, together with the vessels, bags, casks, or other things, wherein the same are contained, and the horses, cattle, carts, and other carriages, made use of in removing the same; half to the king, and half to such officer of the customs, who shall seize, inform, or sue for the same. 12 Geo. c. 28. 5 Geo. III. c. 43. 8 Geo. c. 18.

All seizures of vessels or boats of 15 tons or under, and of horses or other cattle and carriages, by virtue of any act relating to the customs, may be prosecuted, heard, and determined, before two justices residing near where the seizure was made. 8 Geo. III. c. 18. 5 Geo. III. c. 43. 29 Geo. III. c. 68.

And all penalties and forfeitures in the excise may be sued for, levied, and mitigated as by the laws of excise, or in the courts at Westminster, half to the king, and half to him who shall sue (unless otherwise particularly directed). 29 Geo. III. c. 68. 30 Geo. III. c. 40. 43 Geo. III. c. 69.

Tobacco-stalks or stems, stripped from the leaf, that are imported, shall be forfeited and burnt, and the officer seizing the same shall be allowed *id.* a pound; and persons assisting in unshipping them, &c. shall forfeit treble value, with the vessels, horses, &c. which may be prosecuted and determined before two justices near the place where the seizure was made. (12 Geo. c. 28. 5 Geo. III. c. 43. 8 Geo. c. 18.) By 24 Geo. II. c. 41. and 26 Geo. II. c. 13. no tobacco or stalks exceeding 24lbs. weight, nor any snuff exceeding 10lbs. shall be conveyed by land, without proper certificates, under penalty of forfeiture, together with horses and carriages, and commitment of the carrier to the county-gaol for one month by one justice. The seizure of horses and carriages may be determined by two justices near the place where the seizure was made.

**TOBACCO**, *English*, *Nicotiana minor*, or *Nicotiana rustica* of Linnæus, is a species of tobacco, which was originally a native of America, but now propagates itself plentifully in England and other parts of Europe. The flowers are of an herbaceous yellow colour, appearing in July, and are succeeded by roundish capsules filled with small seeds, which ripen in autumn. The leaves are said by some to be of the same quality with those of henbane; but by others, to be similar to the preceding, but weaker. They have been sometimes substituted in our markets, instead of the true tobacco; but are easily distinguished by their smallness and oval shape, and by being furnished with pedicles. Lewis.

**TOBACCO**, *Kanaster*. See **KANASTER**.

**TOBACCO-WATER**, among *Sheep-Farmers*, a liquor prepared by infusing or boiling tobacco in water. A very useful mode of preparing it is, by boiling one pound of tobacco in two gallons of strong salt brine, adding, after the liquid has become cool, about three ounces of the oil of turpentine. It is sometimes, too, the practice to dissolve fifteen or twenty grains, or more, of sublimate or muriated quicksilver in the turpentine, before it is added to the liquor or mixture. A small proportion of corrosive sublimate, dissolved in spirits of wine, is also a safe and neat mode of incorporating it with the tobacco-water or liquid.

Tobacco-water, or liquor, is likewise occasionally mixed with other substances; as two pints of it have sometimes three ounces of sulphur mixed in them, being put on a fire until they boil together. The liquor is used in an acid state,

The South Down sheep-farmers have a decoction of tobacco, wildvine-root, and sulphur, which is boiled in brine for a quarter of an hour, and then strained off for use.

Tobacco-water, or liquor, is kept ready prepared for the use of farmers in many places where sheep are largely kept, but it is probably the best way for them to provide their own.

This water, or liquor, is a powerfully efficacious remedy in various cases of the scab kind in sheep, and probably in other animals. It is usually applied by shedding or dividing the wool by the fingers and thumbs, and pouring a little of the liquid in along it. It may be used every night, as there may be occasion. Such diseases are readily removed by it in most cases, and especially in long-woolled sheep, in which they often take place.

In gardening, the simple water, or liquor, which is prepared by infusing or boiling tobacco in soft water, without any admixture, or having any such substances as above dissolved in it, is often found beneficial in destroying and removing insects of different kinds on fruit-trees and fruit-shrubs, by having it repeatedly sprinkled over them by means of a watering-pot, or dew-syringe, or in any other way. Many sorts of these trees and shrubs in hot-houses, and other places, are treated in this manner with great effect and advantage in clearing them of such vermin.

**TOBACCO Key**, in *Geography*, a small island in the bay of Honduras, near the coast of Yucatan. N. lat.  $16^{\circ} 45'$ . W. long.  $88^{\circ} 35'$ .

**TOBACCO-Pipe**. See *Tobacco PIPE*.

**TOBACCO-Pipe Clay**. See *CIMOLITE*.

**TOBACCO-Pipe Fish**, in *Ichthyology*, the English name of the *Acus*, or the *SYNGNATHUS Acus* of Linnæus; which see.

**TOBACTLI**, in *Ornithology*, a name which Nieremberg says is often given to the American bird more commonly called *hoathli*.

**TOBAGO**, in *Geography*, one of the Caribbee islands, in the West Indies, about 30 miles in length from south-east to north-west, and about nine in breadth. This island was first discovered by Columbus, in the year 1498; but though projects were formed for settling it, particularly by William, earl of Pembroke, who obtained a grant of it in the year 1628, and also of Barbuda and St. Bernard, they proved ineffectual. About the year 1632, some Zealanders, having fitted out a small squadron for trading to those islands, made such a favourable report of this in particular, upon their return home, that the company of merchants to which they belonged undertook to settle it, and gave it the name of *New Walcheren*, from one of the islands in Zealand. The new colony, in a short time, increased to about 200, who, finding themselves pestered by the visits of the Caribbee Indians, began to erect a fort for their preservation. The Indians had recourse to the Spaniards, who readily granted them assistance. They sent a force upon the island which demolished the rising fort, and exterminated the new colony. It was probably from some Dutch merchants who travelled to Courland, that James, duke of that country, conceived the design of settling Tobago. Being a prince of an active disposition, and finding there was room for such a settlement, he sent over a colony of his own subjects, who settled upon what has since been called *Great Courland Bay*, and erected a small regular fort, with a town, in the neighbourhood; and the duke's title was farther confirmed by a grant from Charles II. king of England, but disputed by the Dutch. Upon the extinction of the Kettler family, dukes of Courland, in the person of Ferdinand, son of duke James, the chief of the

island of Tobago reverted to the crown of England in 1737. By the treaty of Aix-la-Chapelle in 1748, St. Vincent, Dominica, St. Lucia, and Tobago, were declared neutral, and those who remained of the ancient proprietors were left in unmolested possession. By the 9th article of the peace of Paris, signed on the 10th of February, 1763, the three islands of Dominica, St. Vincent, and Tobago, were assigned to Great Britain, and St. Lucia to France; the Charaibes not being mentioned in the whole transactions, as if no such people existed. The climate of Tobago is far more temperate than could be expected in an island that is but 11 degrees 16 minutes north from the equator; for the heat is allayed by the sea-breezes. Tobago has another favourable circumstance to recommend it, by its lying out of the track of those hurricanes that prove so fatal to the other West India islands. The surface of the island is unequal and agreeably diversified; but no part of it is rugged or impassable, though its north-west extremity is mountainous. Its soil is of different kinds, but in general the mould is rich and black, and proper for producing, in the greatest plenty, whatever is raised in other parts of the West Indies. The abundance of springs upon the island contributes to its healthfulness, and its bays and creeks are so disposed as to be very commodious for all kinds of shipping. Its situation, however, requires fortifications to render the island secure against the visits of savages and enemies. Besides its producing the different kinds of wood that are to be found in the other West India islands, the Dutch affirm, that both the true nutmeg-tree and the cinnamon-tree, with that which produces the real gum copal, grows upon the island, but this assertion wants confirmation. Mr. Blome, who, in 1687, wrote "The present State of our American Islands," says that the soil of Tobago produces Indian corn, Guinea corn, pease, beans, French beans, figs, pine-apples, pomegranates, oranges, lemons, limes, plantains, bananas, grapes, guavas, tamarinds, prickly pears, papaws, and a variety of other fruits, which are not to be found in Europe. The cocoa-tree grows here to such perfection, that the Indians call it God's tree, as producing both meat, drink, and clothing. Musk-melons, water-melons, gourds, cucumbers, and pumpions, are raised to perfection: neither is there any want of potatoes, yams, carrots, turnips, parsnips, onions, and manioc. Wild hogs abounded so much in Tobago, that the people killed at least twenty thousand of them every year without their being sensibly diminished. Here are likewise found peccaros, resembling swine, armadillos, guanoes, Indian rabbits, and badgers. Horses, cows, asses, sheep, deer, goats, and rabbits, were probably introduced by the Dutch, and have multiplied exceedingly. The sea is stored with excellent fish, particularly turtle of every kind, and mullets of a most delicious taste, with other kinds unknown in England. In short, the commodities which the country doth, or may produce, are cocoa-nut, sugar, tobacco, indigo, ginger, sarsaparilla, sempervivum, bees'-wax, veneloes, natural balsam, balm, silk-grass, green tar, soap-earth, with many curious shells, stones, marcasites, and minerals. In 1781, the island was surrendered to the French on favourable terms. In 1793, it was again taken by the French, and soon after retaken by the British. N. lat.  $11^{\circ} 16'$ . W. long.  $60^{\circ} 30'$ .

**TOBAGO, Little**, a small island near the east coast of Tobago, about two miles long, and one broad.

**TOBAK**, a town of European Turkey, in Bessarabia, on lake Jalpug. In 1789, the Russians were defeated by the Turks, near this town; 34 miles N.N.W. of Ismail.

**TOBAN**, a town of the island of Cuba; 16 miles N.E. of Trinidad.

**TOBAR**,

TOBAR, a town of Spain, in Old Castile; 18 miles from Burgos.

TOBATA, in *Ancient Geography*, a town of Asia, in the interior of Paphlagonia.

TOBATI, in *Geography*, a town of Paraguay; 50 miles N.E. of Assumption.

TOBED NIGARLEDEGH, a river of New Brunswick, which runs into the St. John, N. lat.  $46^{\circ} 50'$ . W. long.  $67^{\circ} 36'$ .

TOBIANUS, in *Ichthyology*, a name given by Schonveldt and others to the ammodytes, or sand-eel.

TOBIRA, or TOBERA, in *Botany*, a Japanese shrub, figured and described by Kämpfer; see *PITTIOSPORUM*, n. 2. See also *EUONYMUS*, where its ill-agreement with the latter genus is noticed.

TOBIS, in *Ichthyology*, a name given by the Swedes to the ammodytes, or sand-eel.

TOBITSCHAU, or TOWACZOW, in *Geography*, a town of Moravia, in the circle of Olmutz; 10 miles S. of Olmutz. N. lat.  $49^{\circ} 23'$ . E. long.  $17^{\circ} 14'$ .

TORIUS, in *Ancient Geography*, a river of the isle of Albion, the mouth of which is placed by Ptolemy on the western coast, between the promontory Oëtapitorum and that of Ratofathybius.

TOBLER BACH, in *Geography*, a river of Wurtemberg, which runs into the Glatt, 2 miles N.W. of Sultz.

TOBLPAD, a town of the duchy of Stiria; 8 miles S.W. of Gratz.

TOBOL, a river of Russia, which rises in N. lat.  $52^{\circ} 30'$ , and long.  $81^{\circ}$ , in the country of the Kirghizti, in the chain of mountains that parts it from the government of Upha. It pours itself into the Irtysh or Irtyfch at Tobolsk, after running a course of about 500 versts, in which it receives the following rivers; viz. the Ui, the Ifet, the Tura, and the Tavda, all which fall into it on the left. Of these, the Tura is the largest; it rises near Verkhoturina, in the Ural mountains, and glides into the Tobol, in lat.  $57^{\circ} 30'$ , after having taken up the rivers Salda, Tagil, Pyshma, Nitza, &c. into which last-mentioned, the Neiva, the Ætsh, and the Irbit flow. By this accession of waters, the Tura becomes a considerable river, not much inferior to the Tobol itself. The Ifet is likewise a river of some consequence, rising out of a lake two versts from Ekatarineburg; and after having taken up several rivers, as the Sifert, the Sinava, the Tsetsha, and the Mizes, falls into the Tobol, in N. lat.  $57^{\circ}$ . The Tobol has mostly low shores; and in the spring season frequently shade its waters far around.

TOBOLOVO, an ostrog of Russia, in the government of Tobolsk, on the Enisei. N. lat.  $69^{\circ} 40'$ . E. long.  $86^{\circ} 42'$ .

TOBOLSK, a city of Russia, and capital of a government, at the confluence of the Irtyfch and Tobol. It is the see of an archbishop, and was heretofore the capital of all Siberia. This city is divided into the Upper and Lower Towns. The Upper Town stands very high, on the east side of the Irtyfch; and the Lower Town lies on a plain, between the hill on which the former is built, and the river. Both towns taken together are of a very large circumference; but the houses being mostly built with wood, it was nearly consumed by fire about the year 1786, and afterwards rebuilt chiefly of stone. It contains about 15,000 inhabitants. In the Upper Town, which is properly called the city, stands the fort, which was built with stone, by governor Gagarin. In the fort are the governor's court, as it is called, the governor's house, the archbishop's palace, the exchange, and two of the principal churches, which are

all stone buildings. The Upper Town, which stands on the east side of the fort, and is inclosed within an earthen rampart, affords nothing remarkable, but a market for provisions and all kinds of small ware, three wooden churches, and a convent. The Lower Town contains a market-place for all kinds of provisions, on which several shops are built. The Upper Town is out of the reach of inundations from the river, by its high situation, which, however, is attended with this inconveniency, that the inhabitants are under a necessity of going down the hill for water. Besides, large masses of earth fall from the side of a hill, on which the town stands, towards the river, almost every year, which obliges the inhabitants to pull down and rebuild the houses that stand near the declivity. The Lower Town, indeed, has water at hand, but is exposed to inundations when the river overflows its banks; but such floods do not happen every year. The town is very populous, and almost the fourth part of its inhabitants is composed of Tartars, who are partly descended from those that were settled there before the conquest of Siberia, and partly from the Bucharians. These Tartars, in general, behave very quietly, and carry on some commerce; but practise no mechanic trades. They are very sober, and averse from intemperance, and all kinds of riotous living. The rest of the inhabitants are Russians, whose ancestors were banished hither for their crimes, or such as are exiles themselves. As every thing is sold here so exceeding cheap, that a common man may live very well at Tobolsk at ten rubles a year; indolence and sloth prevail to such a degree, that it is a hard matter to get the least utensil, &c. made, though the town abounds with artificers, who want neither tools nor materials to carry on their respective trades. The commerce is in a flourishing condition in this city: and the traffic which the Bucharian and Kalmuck merchants carry on in Indian goods, with which they supply all Siberia, and part of Russia, is very considerable. All the Chinese caravans are obliged to pass through this town; and all the furs furnished by Siberia are brought into a warehouse in this city, and from hence are forwarded to the Siberian chancery at Moscow. Several of the Swedish officers, who were taken prisoners at the battle of Pultawa, and sent to Tobolsk, set up schools here, in the year 1713, for teaching the children of Swedes, Russians, Cossacks, Tartars, &c. the German, Latin, and French languages, with geography, geometry, and drawing. Many of them also took in boarders. These schools acquired great reputation; so that children were sent hither for education, from a considerable distance, and the exemplary behaviour of these military pedagogues was attended with uncommon success. However, when the peace of Nyftadt was concluded, the Swedish officers returned into their own country, and then these beneficial seminaries of learning dropped of course. Some time after a German school was founded here, under the auspices of the empress; 1000 miles E. of Moscow. N. lat.  $57^{\circ}$ . E. long.  $68^{\circ} 14'$ .

TOBOLSKIAN TARTARS, derive their appellation from the river Tobol, on which they dwell; and they are the descendants of the inhabitants of Isker or Sibir, their ancient capital, which being reduced to a heap of ruins after Yormak's conquest, they abandoned; and instead of it the Russians afterwards built Tobolsk. These are distinct from the Tartar inhabitants of Tobolsk, who are a barbarian colony. Their number amounts to upwards of 4000 males.

TOBOLSKOI, a government of Russia, extending from N. lat.  $55^{\circ}$  to  $78^{\circ}$ . E. long.  $59^{\circ}$  to  $108^{\circ}$ , including a considerable part of Siberia. Tobolsk is the capital.

TOBORON,

TOBORON, a town of Thibet; 53 miles N. of Tourfan Hotun.

TOBOSO, EL, a town of Spain, in New Castile; 37 miles S. of Huete.

TOBRONA, a town of the island of Cuba; 148 miles S.W. of Havannah.

TOBRUS, in *Ancient Geography*, a town of Africa Propria, in the number of those situated between the river Bagradus and the town of Thabraea. Ptolemy.

TOBULLA, in *Geography*, a town of Africa, on the E. coast of Tunis; 8 miles N.W. of Medea.

TOBY, a town of Sweden, in East Bothnia, near the Gulf; 20 miles N. of Christianfand.

Toby's *Creek*, a river of Pennsylvania, which runs into the Allegany, N. lat.  $41^{\circ} 8'$ . W. long.  $79^{\circ} 40'$ .

TOCA, a central town of New Granada, E. of Bogota, the capital.

TOCAIGH, a bay on the W. coast of the island of Owhyhee: the depth of water was 25 fathoms; the bottom a stiff clay, and good holding ground, incommoded by a patch of rocky bottom, which was found to shoal suddenly, and the depth to decrease to 7. *f.* and 2 fathoms, about the fourth of a mile to the south-westward of the anchoring-place; and consequently to be a very great inconvenience to the roadstead, which at best, in the opinion of captain Vancouver, is but a very indifferent one, being entirely exposed to the north-west winds, and the western oceanic swell, which beats with great violence in the reefs that encompass the shores. These reefs stretch out a mile or upwards, leaving between them and the land a narrow channel, that affords comfortable and commodious landing for small boats and canoes; but the landing is at too great a distance from the place of anchorage to allow of prosecuting any debarkation from the ship. N. lat.  $20^{\circ} 3'$ . E. long.  $204^{\circ} 4'$ .

TOCAIMA, a central town of New Granada, in the immediate proximity of Bogota, the capital, and W. of it: founded in 1544, at some distance from the river Poti, called Bogota, not far from its confluence with the river Magdalena. Its situation is bad, exposed to great heats, and numerous venomous creatures, and even destitute of water. But the district is very fertile in cacao, tobacco, sugar, maize, yucas, plantains, potatoes, &c. and the fish are abundant in the rivers of Bogota and Fufagafuga, though there be many alligators. The inhabitants, about 700, are mostly poor. Here are mines of excellent copper, though not worked.

TOCANTIN'S RIVER, a river of South America, formed by the union of a number of small rivers in Brasil, which rise about the 18th or 19th degrees of south latitude, and between the 50th and 51st degrees of west longitude. Its course is due north to the 2d degree of south latitude, when it joins the Guanapu, about 120 miles from the sea, and takes the name of Para, from a city so called.

TOCAT, or TOKAT, a city of Asiatic Turkey, in the pachalic of Sivas, anciently a city of Pontus, called *Berisa*. It is situated on the river Tosanlu, in the corner of a valley, and almost surrounded with mountains, which afford quarries of marble, and well supplied with water from innumerable springs. On the top of a lofty rocky mountain, on the W. side of the town, are the remains of an old castle. The streets are well paved, but frequently built on uneven ground. The houses are tiled, and mostly built with wood. It is the residence of a *cadi*, 2 *waiwode*, and an *aga*, commanding a thousand janizaries, and some *spahis*. The inhabitants are computed to be 60,000, consisting of 20,000 Turkish families, 4000 Armenians, and about 400 families

of Greeks. The Armenians have seven churches, the Greeks only one. The Armenians make an excellent wine, resembling claret in flavour, but stronger. Fruits are abundant in this town, and the grape-vines are excellent. It is the see of a metropolitan, dependent on the archbishop of Niesara, or Neocæsarea, an ancient city, almost ruined, about two days' journey from Tocat. Here are some manufactures of silk and yellow Turkey leather; but the chief trade is in copper vessels, kettles, candlesticks, &c. which are sent to Constantinople, Egypt, &c. Tocat may be considered as the centre of trade of Asia Minor. The copper is obtained from the mines of Gumiscana, at the distance of three days' journey from Trebisond, and from those of Caftan Boal, yet richer, and situated ten days' journey from Tokat, on the W., towards Angora. The caravans from Diarbek arrive in eighteen days, from Sinob in six, from Bursa in twenty, from Smyrna in twenty-seven, and proportionally less on horseback, or on mules; 40 miles N.W. of Sivas. N. lat.  $39^{\circ} 35'$ . E. long.  $36^{\circ} 30'$ .

TOCAYO. See TOCAYO.

TOCCATA, Ital. from *toccare*, to touch: to prelude, to touch an instrument, to play a short movement extempore, previous to the performance of a regular piece.

TOCCATINA, a short prelude, or trial of an instrument.

TOCCAVIENSIS BOLUS, *Bole of Tokay*, in the *Materia Medica*, a fine medicinal earth, dug about Tokay in Transylvania, and esteemed a powerful astringent. Kentman calls it the *bolus Pannonica vera*; and Crato, *bolus Hungarica*.

This last author esteemed it superior even to the bole armenic of Galen, and had a great opinion of it in malignant fevers. It is a fine and pure earth, and very heavy, moderately compact in its texture, but not very hard; and in colour of a considerably deep and strong yellow. It is naturally of a smooth surface, and does not stain the fingers in handling. It ferments violently with acid menstrua, and does not become red in burning. Hill. See BOLE.

TOCHEN, in *Geography*, a town of Germany, in the principality of Anhalt Zerbit; 5 miles W. of Zerbit.

TOCHU, a town of Africa, in the kingdom of Quoja.

TOCKAY, in *Zoology*, the name of a species of Indian lizard, distinguished from the other kinds, by being spotted all over.

TOCKSDORF, in *Geography*, a town of Prussia, in the province of Bartenland; 6 miles N.W. of Rastenburg.

TOCMIA, in *Ancient Geography*, a town of Arcadia, in the southern part to the N.W. of Megalopolis, and E. of the Alpheus. It stood upon an eminence; but it was in ruins in the time of Pausanias.

TOCMOL, in *Natural History*, a name given by some to the common turtle.

TOCOCA, in *Botany*, a Caribbean name, used by Aublet.—Guian. 437. t. 174. Juss. 330. See MELASTOMA.

TOCOLOSIDA, in *Ancient Geography*, a town of Africa, in Mauritania Tingitana. Ptolemy. The Itinerary marks it 48 miles from Tingis, and three miles from Volubilis.

TOCORARY, or TUKORARI, in *Geography*, a town of Africa, in the country of Ante; 10 miles E. of Infuma.

TOCORT. See TUGGURT.

TOCOSANNA, in *Ancient Geography*, a river of India, on the other side of the Ganges. Ptolemy places its mouth in the Ganges.

TOCOYENA, in *Botany*, an unexplained name.—Aubl. Guian. 131. t. 50. Juss. 201. Lamarck Illustr. t. 163.

See **GARDENIA**, of which this is probably a species. The author calls his only species *T. longiflora*, and his description contains the following particulars.

The *stem* is three feet high, erect, simple, leafy, scarcely shrubby. *Leaves* opposite, erect, pliant, fifteen inches long, lanceolate, entire, smooth, tapering at each end, on smooth *footstalks*, about an inch and half in length, attached to a pair of triangular, acute, combined, intrasfoliateous *stipulas*. *Flowers* about fourteen in a terminal head, in opposite sessile pairs, each flower accompanied by two small sealy *bractæas*. *Calyx* superior, bell-shaped, in five small segments, measuring with the *germen* not more than four lines. *Corolla* with a yellowish cylindrical tube, as thick as a goose-quill, and nine or ten inches long, dilated at the throat, and terminating in a white bell-shaped limb, with five ovate, equal, spreading segments. *Anthers* nearly sessile, between the segments of the corolla, oblong, incumbent. *Germen* oval, inferior. *Style* capillary, the length of the tube, tumid and hairy for an inch below the top. *Stigma* of two large, compressed, oval lips, included within the throat of the corolla. *Berry* oval, an inch long, crowned with the calyx, of two cells, with numerous roundish seeds, imbedded in viscid pulp. The *flowers* have a very sweet smell. Aublet met with several plants of this species in the wood of Aroura in Guiana, flowering in August.—All the leaves were perforated or gnawed by insects. His dried specimen of the flower is as black as ink. If *mannia* of Thunberg and Salisbury be distinct from *Gardenia*, the present plant should seem to belong to the former.

**TOCRUM**, in *Geography*, a town of Bengal; 8 miles S. of Koonda.

**TOCRUR**, a town of Africa, and capital of a kingdom, in Nigritia, on the north side of the Niger, W. of Cashna; 270 miles E.N.E. of Tombuctoo. N. lat. 16° 32'. E. long. 6° 5'.

**TOCSON HORUN**, a town of Thibet; 20 miles W.S.W. of Tourfan. N. lat. 43° 26'. E. long. 89° 14'.

**TOCUYO**, a city of South America, in the government of Venezuela, situated in a valley formed by two mountains. Its division and construction are very regular: the streets are on a line, and sufficiently wide. It has a well-built parish church, on which depends a chapel of ease. The Franciscans have one monastery, and the Dominicans another. It is governed by a common-council. The climate is rather cold than hot; and though the sky is often overcast, the air is wholesome. The inhabitants are graziers, agriculturists, artificers, and traders. The wheat of its vicinity is reckoned the best in the province, and furnishes sufficient for the consumption of many towns of the interior. They export from 8000 to 10,000 quintals of flour. From the wool of their sheep they fabricate coverlids, and other cloths, which they carry as far as Maracaibo and Carthagena. They have also tanneries and taweries, and, like the inhabitants of Carora, work up as many as they can of the raw materials, and sell the rest. Another article of commerce, very lucrative to the citizens of Tucuyo, is salt, which they bring from the salt-ponds of Coro. In this city are reckoned 10,200 persons, who are reproached with the crime of suicide. Tucuyo is 90 leagues distant S.W. of Caraccas, and 20 leagues N. of Truxillo. N. lat. 9° 35'. Long. W. of Paris 72° 40'.—Also, a river of Venezuela, which discharges itself into the sea, 25 leagues E. of the Gaigues, which runs 16 leagues W. of Coro. The source of Tucuyo is about 15 leagues S. of Carora, upwards of 60 leagues from the sea. It is navigable as far as Banagua, a village situated on its banks, at the distance of 40 leagues from its mouth. Its vicinity

furnishes abundance of timber of the largest size, and fit for every kind of building. Depous, vol. i. and ii.

**TOD of Wool** is mentioned in the statute 12 Car. II. c. 32. as a weight containing twenty-eight pounds, or two stone. See **WEIGHT**.

Some will have the word derived from the French, *toilet*, a wrapper, within which, by usage, two stone of wool are folded.

A last of wool contains 12 sacks, a sack 2 weighs, 13 tods, 26 stone, 52 cloves, or 364 pounds.

**TOD-Head**, in *Geography*, a cape on the east coast of Scotland, in the county of Kincardine; 5 miles S. of Stonehaven. N. lat. 56° 51'. W. long. 2° 11'.

**TODDALIA**, in *Botany*, Juss. 371. Poiret in Lam. Dict. v. 7. 693, a barbarous name made out of the Kaka-toddali of Rheede, Hort. Mal. v. 5. 81. t. 41. (See **SCOPOLIA**.)

—Todda, with some addition, is the appellation of other Indian plants, as Todda-pana of *Cycas circinalis*, and Toddavaddi of *Oxalis sensitiva*. We humbly hope that the worthy M. Poiret, who is so highly displeas'd at our wishing to retain a *Scopolia*, will approve of our having so much labour'd to establish a **POIRETIA**. See that article.

**FODDA-PANA**, the name by which many authors call the *palma farinifera*, or sago-tree.

**TODDINGTON**, or **TUDDINGTON**, in *Geography*, an ancient market-town in the hundred of Manshead, and county of Bedford, England; is situated five miles N. by W. from Dunstable, and 39 miles N.W. by N. from London. A market was originally held here on Thursdays, by a grant from king Henry III. in 1218; but this was changed to Saturday, by a charter of Edward II. in 1316, which was confirmed by Richard II. in 1385. In 1681, the market was so considerable, that sixteen butchers rented stalls in the market-place. It gradually declined, and of late years has been wholly discontinued. The market-house was pulled down in 1799, and the materials sold. It is probable, that it had been before discontinued, and afterwards revived, as Leland does not include Toddington in the list of the market-towns in Bedfordshire. A fair was granted by the charters of 1218 and 1316: five are now held in the year. The population return of the year 1811, states the parish to contain 259 houses, and 1143 inhabitants. The manor of Toddington was given by William the Conqueror to Ernulfus de Hefdin, ancestor of the earls of Perch. On the death of the last earl, in 1216, it devolved to the earl of Pembroke, and from him to Paulinus Peyvre, steward of the household to Henry III. From the Peyvre family, the manor descended to sir Thomas Cheney, K. G. whose son, Henry, was knighted by queen Elizabeth in 1563, she being then on a visit to him at Toddington. In 1572, she created him lord Cheney. Lord Cheney built a noble mansion at Toddington, of which nothing now remains but the kitchen, which is remarkably spacious. Toddington church is a handsome structure; the frieze, on the outside, is decorated with grotesque figures of animals. The south transept contains some ancient monuments of the Peyvres, and also those of the Cheneys. The north transept was the burial-place of the Wentworths, and contains two monuments to lady Maria, and lady Henrietta Wentworth, on each of which 2000*l.* were expended. Both transepts are in a shameful state of dilapidation. In the year 1443, an hospital was founded at Toddington, by sir John Broughton, for three poor men, and a master or chaplain, who was to pray for the souls of the Peyvre family. There are now no traces of the hospital: the stones were used in building the market-house. Lysons's Magna Britannia, vol. i. Bedfordshire, 1806.

**TODDIPOODY**, a town of Hindoostan, in the circar of Rajamundry; 18 miles E.S.E. of Rajamundry.

**TODDY**, or **TODDI**, is a juice drawn from various kinds of palms, by cutting off the branch intended by nature to produce fruit, and receiving from the wounded branch the sap which was designed for the nourishment of the future crop. But as toddy, although sweetish when first drawn, is in a state of fermentation in the course of 24 hours, acquiring an intoxicating quality, and thus becomes sour and harsh, it could not have been the palm-wine of the ancients; which must have kept for some time, as it was carried on the rivers during voyages of many days, and even appears to have been stored up. Toddy is used with molasses, rice, and other ingredients, in the distillation of *Arrack*; which see. The toddy of the date-tree is said to be of an inferior quality to that from some other kinds of palms. The palm-wine was made in Babylonia, where palms abounded, of the fruit of the palm-tree. This was sweet to the taste, but apt to give the head-ache. The palm, as Herodotus informs us (*Clio*, c. 193.) produced to the inhabitants of Babylonia, bread, wine, and honey. The wine must have been very plentiful, for he says that the boats which descended the Tigris from Armenia, some of which were very large, were loaded with palm-wine as the principal article of their commerce. We derive similar information from Xenophon, who speaks of the floats that passed the Euphrates at Carmanda, and the Tigris at Cænæ. We learn, from the travels of M. Burckhardt in Nuba (Nubia) in 1813, that the practice of making wine as an article of commerce is discontinued in Mesopotamia and Babylonia, where the date-trees abounded, and where the profusion of fruit rendered wine so plentiful, because in modern times the want of a proper distribution of water for irrigation, has left only a small proportion of date-trees; and hence it is probable, that none of the fruit can be spared from the necessary demand for food. Kämpfer is silent on the subject of palm-wine; and this circumstance satisfactorily proves the discontinuance of the practice of making it in those countries. M. Burckhardt tells us, that in all the larger villages of Nubia, the use of palm-wine is very common; and at Derr, the reputed capital of the country, a great quantity of spirit is consumed. The wine, he says, does not taste amiss; but it is too rich and too thick to be drunk with pleasure. When the date-fruit has acquired its full maturity, it is thrown into large earthen boilers, and left to boil without interruption for two or three days. It is then strained, and the clear juice put into earthen jars, well closed and buried in the ground, where it ferments. It is left ten or twelve days under ground; at the expiration of which time it is fit to drink. It keeps for twelve months, and then turns sour. The aqua-vitæ made from dates is of a very good quality, and keeps well for years. People of the upper classes at Derr are every evening intoxicated either with date-wine or spirits, of which great quantities are consumed. They are sold openly. From Siout, southward, through Upper Egypt, date-spirits are made and publicly sold; the pacha receiving a tax upon it from the inn-keepers: they also make a kind of jelly or honey from the dates, which serves for a sweet-meat.

**TODDY-Tree**. See **MAMMEE-Tree**.

**TODEA**, in *Botany*, a supposed genus of ferns, dedicated by Willdenow to the memory of the Rev. Henry Julius Tode, a clergyman of Mecklenburg, who died in 1797, aged 64. He is distinguished among cryptogamic botanists, as the author of an accurate and practical work, in quarto, with numerous plates, entitled *Fungi Mecklen-*

*burgenses Selecti*, published at Lunenburg, in 1790, to which the reader will find frequent references in our several articles relating to the order of *Fungi*. This genus, however, is sunk in **OSMUNDA**; see that article, n. 3.

**TODENDORP**, in *Geography*, a town of the duchy of Holstein; 6 miles N.E. of Hamburgh.

**TODI, MARIA FRANCISCA**, in *Biography*, born in Portugal in 1748, arrived in England in 1777, with Jermoli, as first woman in the comic opera. She must have improved extremely after she left this country, where she remained only one season, and was little noticed; her voice being feeble, and seldom perfectly in tune. But she afterwards became the most captivating singer for taste and expression in cantabile airs, in France and Germany (according to report), that ever appeared in Europe. She was taught by Perez.

**TODI**, in *Geography*, a town of the Popedom, in the duchy of Spoleto, near the Tiber, the see of a bishop, immediately under the pope. It contains several churches and convents; 18 miles W. of Spoleto. N. lat. 42° 47'. E. long. 12° 18'.

**TODIALOOR**, a town of Hindoostan, in the country of Coimbatore; 5 miles N. of Coimbatore.

**TODIVESTI**, a town of Moldavia; 6 miles N.E. of Suzava.

**TODOROVA**, a town of Croatia; 18 miles W.N.W. of Novi.

**TODOS SANTOS**. See *ALL-Saints*.

**TODS**, a town of the state of Virginia; 9 miles E.N.E. of Hanover.

**TODTENVOGEL**, in *Ornithology*, a name by which Gesner and some other authors have called that species of centanthe, known in England by the name of the *stone-chatter*, *stone-smitch*, or *moor-titling*.

**TODTIBERG**, in *Geography*, a mountain of Switzerland, and reckoned one of the highest in the country, in the road from Disentis to the Grisons.

**TODUCÆ**, in *Ancient Geography*, a people of Africa, in Mauritania Cæfariensis, towards the source of the river Ampaga.

**TODUS, TODY**, in *Ornithology*, a genus of the order *Picæ*, the characters of which are, that the bill is awl-shaped, somewhat depressed, obtuse, straight, and at its base beset with bristles; the nostrils are ovate and small; the feet are formed for walking; and the outer toe is connected at the base to the middle one.

#### Species.

**VIRIDIS**. Green, with a red breast: the green tody. Found in the warmer parts of America, and the neighbouring islands.

**CINEREUS**. Ash-coloured, with the under part yellow: the *Tie-tie* of Buffon; the grey and yellow fly-catcher of Edwards. Found in open places of Surinam and Guiana.

**FUSCUS**. Ferruginous, under part olive-coloured, spotted with white; the tail ferruginous, and wings crossed with a blackish bar. Found in South America, less than the green.

**CÆRULEUS**. Blueish, with white throat; temples, throat, and abdomen orange. Found in America, of the size of the green.

**VARIUS**. Varied with blue, black and green; the bill, head, throat, neck, feet, nails, and tail black; the margin of the tail, and the coverts of the wings, green. Found in India.

**LEUCOCEPHALUS**. Black, the head subcristated; throat and upper part of the neck white: white-headed tody of Latham. Found in America.

**BRACHYURUS.** Black, the vertex, neck, back, and short tail black: the short-tailed tody of Latham. Found in America.

**PLUMBEUS.** Above lead-coloured hoary, beneath milky; the crown, wing-feathers, and tail black: plumbeous tody of Latham. Found in Surinam.

**OBSCURUS.** Above brown and black, underneath very fordid white, with pale throat: the dusky tody of Pennant and Latham. Found in Rhode island.

**REGIUS.** Black and brown; the breast whitish, striated transversely with blackish; the throat and eye-brows white; the abdomen, rump, and tail red; the crest ferruginous at the apex, tipped with black: king tody of Latham. Found in Cayenne.

**PARADISEUS.** Crested head black; body white; tail wedge-formed; the intermediate tail-feathers very long: pied bird of paradise of Edwards, and paradise fly-catcher of Latham. It has the following varieties; viz. the tody with wings and tail pale-red; the tody underneath white, the breast from cærulescent to cinereous; and the Brazilian crested tody. Found in Africa and the island of Madagascar.

**FERRUGINEUS.** Ferruginous-black, underneath ferruginous; wing-feathers marked with a brown bar; cheeks spotted with black and white: the ferruginous-bellied tody of Latham. Found in Cayenne.

**NOVUS, or GULARIS.** Brown, underneath white; throat white, and breast spotted with brown, above yellow: white-chinned tody of Latham.

**PLATYRHYNCHOS, or ROSTRATUS.** Brown-yellowish, beneath yellow, throat whitish; vertex lead-coloured, with a white spot upon it; wings and tail brown; bill very broad: the broad-billed tody of Latham.

**MACRORHYNCHOS, or NASUTUS.** Black, bill very broad; chin, sides of the cheeks, abdomen, vent and rump red: the great-billed tody of Latham.

**RUBECULA.** Cinereous, with orange throat and breast, and white abdomen: the red-breasted tody of Latham. Native of New Holland.

**XANTHOGASTER, or FLAVIGASTER.** Brown-cinereous, six inches long; beneath luteous, with pale bill: the yellow-bellied tody of Latham. Native of New Holland.

**CRISTATUS.** Crest crimson; body brown, spotted with white. Found in Guinea.

**TOEBAN,** in *Geography*, a town on the N. coast of the island of Java.

**TOELCHUS de Apie,** a district of South America, in the country of Patagonia.

**TOELCHUS de la Caballo,** a district of South America, in the country of Patagonia.

**TOE-LING HOTUX,** a town of Chinese Tartary; 375 miles E.N.E. of Peking. N. lat. 42° 22'. E. long. 123° 29'.

**TOENDE,** in *Commerce*, a corn measure in Denmark, equal to 8 scheffels or skiepers, or 32 foertels or sierdingers, and 12 toendes = a last: 100 toendes of Copenhagen, answer to about 49½ English quarters. A last of Spanish salt, or of coals, contains 18 toendes, and the toende = 8 skiepers or 176 pots, which contain 5½ Danish cubic feet; but Norway salt is sold by weight, and the toende must weigh 250 lbs. Danish weight, or 275 lbs. avoirdupois. A last of French salt, or of lime, contains 12 toendes, corn measure; a last of oil, butter, and other fat substances, is 12 toendes, beer measure; and a toende of beer must hold 4¼ Danish cubic feet, or 136 pots. By a tonne or toende of hard corn is meant as much land as can be sown with 1 toende of rye, 1 of barley, and 2 of oats. What is called a toende offaatland or arable land is the fourth part

of the above, and contains 563½ Danish square rutes, or 220 English square perches. Thus the toende of hard corn is = 5½ English acres. A Danish square foot contains about 153 English square inches; or 16 Danish square feet = 17 English square feet nearly.

**TOENII,** in *Ancient Geography*, a people of Germany, in the vicinity of a lake, which was common to them, the Rhætiens, and Vindelicians. Ptol.

**TOENJOKER,** in *Geography*, a small island in the East Indian sea. S. lat. 5° 30'. E. long. 132° 32'.

**TOES,** by anatomists called *digiti pedis*, are the extreme divisions of the feet, answering to the fingers of the hand, and resembling them in figure, and make the third part of the foot. See **EXTREMITIES.**

**TOES, Adhesions of the.** It is a frequent thing to meet with new-born infants with their fingers or toes cohering or growing together, either by a strict adhesion of the flesh, or else by some loose productions of the skin, as in the feet of ducks and geese; and a disorder of the same kind is also sometimes found in adults, from accidents; as when the fingers or toes have been neglected, after an excoriation of them by burns or wounds. In both these cases the surgeon's assistance is necessary, partly to remove the deformity, and partly to restore the proper use of the fingers.

These adhesions, according to the nature of the disorder, are to be separated by cutting out the intermediate skin, or else barely by dividing them from each other with a pair of scissors. When this is done, to prevent their cohesions again, each finger must be invested separately with a spiral bandage about an inch broad, dipped in lime-water and spirit of wine.

Sometimes the fingers, instead of adhering to each other, grow to the palm of the hand, from wounds or burns; so that they cannot be by any means extended, or drawn back to open the hand. The method of relieving this disorder is first very carefully to separate the fingers from the adhesions of the palm, without injuring their tendons, then dress them with a vulnerary balsam, and scraped lint, and extend them on a ferula or thick paste-board; and let them remain in this extended posture, separately to be dressed till they are perfectly healed; but at every dressing they must be gently moved, to prevent a rigidity or stiffness of the joints. Heister.

**TOE,** in the *Manege*, is the stay of the hoof upon the fore-part of the foot comprehended between the quarters.

We commonly say the toe before, and the heel behind, in French *pince devant et talon derriere*; implying, that in horses, the toe of the fore-feet is stronger than the toe of the hind-feet: and, on the other hand, that the heels behind are stronger than those before; and accordingly, in shoeing we drive highest in the toes of the fore-feet, and in the heels of the hind-feet.

A horse that does not rest his hind-feet all equally upon the shoe, but raises his heels, and goes upon the toes of his hind-feet, is called in French *rampin*.

**TOE-Head,** in *Geography*, a cape of the county of Cork, Ireland, not far from the Stags of Callihaven. N. lat. 51° 27'. W. long. 9° 9'.—Also, a cape of Scotland, on the S.W. coast of the island of Lewis, in that part called Harris; 42 miles S.W. of Stornaway. N. lat. 57° 50'. W. long. 7° 5'.

**TOE-Shell,** in *Conchology*. See **POLLICIPES.**

**TOE-Stick,** in *Agriculture*, the stick or bar which confines that part of small carts in its place, that contains the load, but which, on being slipped out, lets that or a part of it be discharged. It has been observed in the Corrected Agricultural Report of the County of Norfolk, that Mr. Overman,

Overman, of Burnham, in that district, has made an improvement in his carts of this kind: instead of the toetick drawing out to let the back or framed part of the cart tilt up, and deliver the load or part of it, this contrivance turns in the centre on a pivot, and the hooks which confine it at the ends, are each in a position the reverse of the other, by means of which it is expeditiously effected.

TOESA, in *Commerce*, a long measure in Spain; the toefa or brazza is 2 varas, or 6 feet, that is,  $66\frac{3}{4}$  English inches; a paso or pace, is 5 feet; an estadal, 12 feet, or 4 varas; and a cuerda,  $8\frac{1}{2}$  varas.

TOESCHI, ALESSANDRO, in *Biography*, the head of a celebrated musical family from Romania, settled at Munich, who in 1756 was appointed concert-master to the elector of Bavaria's ecclesiastical band.

TOESCHI, CHARLES JOSEPH, after being director of the chamber-music of the court of Bavaria, in 1756 was appointed first violin in the famous band of the elector palatine at Manheim. He was seven years concert-master, and engaged in other honourable professional employments about the court of Manheim till 1786. In 1766 he published at Paris six symphonies; violin quartets; and flute concertos. About the same time, six violin duets, and other works at Amsterdam. His style is full of fire, new effects, and in slow movements, grace and elegance. He was a disciple of the great Stamitz, and died at Manheim in 1788, in the 60th year of his age, leaving behind him an excellent private character.

TOESCHI, JOHN, concert-master at Manheim, and an admirable performer on the violin. He was one of the principal ornaments of the famous court-band in 1756.

TOESCHI, SUSANNAH, a singer of great merit in the service of the court at Munich, brought up under Holtzbauer, the maestro di capella to the elector palatine.

TOESOBIUS, in *Ancient Geography*, a river of the isle of Albion, which had its mouth, according to Ptolemy, on the western coast, between the gulf Sercia and the promontory Ganganorum: probably the river Conway.

TOE-YAH-YAH, in *Geography*, a bay of Owhyhee, one of the Sandwich islands, extending along the whole coast from the westernmost point, to the northern extremity of the island, and bounded to the N. by two very conspicuous hills. Towards the bottom of the bay there is foul, corally ground, extending upward of a mile from the shore, without which the soundings are regular, with good anchorage, in twenty fathoms. Cook's Third Voyage, vol. iii.

TOFIELDIA, in *Botany*, was so called by the late Mr. Hudson, after his correspondent Mr. Tofield, who resided in the neighbourhood of Doncaster, and to whom British botanists are indebted for the discovery of *Vicia lithynica*, the original specimens of which are preserved in his herbarium, now belonging to William Younge, M.D. F.L.S. of Sheffield, Yorkshire.—Hudf. Angl. ed. 2. 157. Sm. Fl. Brit. 397. Dryandr. in Ait. Hort. Kew. v. 2. 324. Pursh 246. Kunth Nov. Gen. et Sp. Pl. v. 1. 267. (Anthericum; Linn. Gen. Pl. ed. 1. 106, but not of the subsequent editions. Narthecium; Ger. Gallopr. 142. Juff. 47. Michaux Boreal.-Amer. v. 1. 209. Lamarck Illustr. t. 268.)—Class and order, *Hexandria Trigynia*. Nat. Ord. *Tripetaloides*, Linn. *Junci*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, membranous, three-cleft, small, permanent. *Cor.* Petals six, oblong, concave, equal, spreading, permanent, many times longer than the calyx. *Stam.* Filaments six, opposite to the petals, awl-shaped, simple, smooth, about the length of the corolla; anthers incumbent, roundish-heart-shaped. *Pist.* Germens three, superior, converging, pointed, termi-

nating in as many short, distant, vertical styles; stigmas capitate. *Peric.* Capsules three, connected at the base, gibbous, keeled, membranous, of one cell and two valves, bursting chiefly at the inner edge. *Seeds* numerous, elliptic-oblong, angular, inserted into the inner margin of each valve.

Eff. Ch. Calyx three-cleft. Petals six, equal. Styles vertical, short. Capsules three, superior, combined at the base. Seeds numerous. Anthers roundish.

The small membranous permanent calyx, more or less distantly separated from the other parts of the flower by an elongation of the base of the latter, is the very peculiar character of *Tofieldia*. By this it is distinguished from *HELONIAS*, *NARTHECIUM* and *ANTHERICUM*, with all which it has been confounded; see those articles. *Helonias* moreover has a simple germen and capsule, with very few seeds. *Narthecium* and *Anthericum* have each a simple style; the former hairy filaments, and tunicated seeds; the latter angular seeds.

Five of the six species, now known to compose the genus before us, have been confounded together as one. We shall give their characters, and most essential synonyms. The whole history of the mistakes which have embroiled the synonyms and characters, both generic and specific, of *Tofieldia*, have lately been detailed, more at length than suits our purpose here, in a paper communicated to the Linnæan Society by the writer of the present article.

The species are all perennial and herbaceous, with simple stems, spiked, or generally clustered, flowers, sword-shaped, equitant, mostly radical, leaves, the habit of the whole very nearly according with *Narthecium*. The seeds, in some instances, betray an affinity to that genus, in a little membranous appendage at each extremity, as may be seen in our *T. alpina*.

1. *T. palustris*. Scottish Asphodel, or Marsh *Tofieldia*. Hudf. n. 1. Fl. Brit. n. 1. Ait. n. 1. Engl. Bot. t. 536. (*T. pusilla*; Pursh n. 1. *Anthericum calyculatum*; Linn. Sp. Pl. 447. Fl. Lapp. ed. 2. 106. t. 10. f. 3. Fl. Dan. t. 36. Lightf. Scot. 181. t. 8. f. 2. *Helonias borealis*; Willd. Sp. Pl. v. 2. 274.)—Head of flowers ovate. Stem smooth, thread-shaped, leafless. Petals obovate, obtuse. Germens roundish.—Native of bogs, and the margins of rivulets, on the mountains of Lapland, Scotland, Durham, and North America, flowering about July. A little smooth plant, of a deep green, with a slender solitary stem, from four to six inches high, naked, except an occasional small leaf at the base. The radical leaves are two inches long, erect, forming several tufts. Flowers small, pale green, in a solitary ovate-oblong dense head, scarcely more than half an inch in length, often much less. There are hardly any discernible bractæas, the calyx being close to the main stalk, and divided down to the base, into three small, acute, membranous segments. The rest of the flower is elevated on a short stalk within the calyx, which, as the fruit advances, becomes very conspicuous. The capsules are obovate, each about the size of mustard-seed, crowded together into a globular form, minutely pointed, and crowned by the styles.

Michaux and Pursh, mistaking what we shall next describe, for the true Linnæan *Anthericum calyculatum*, justly considered this as a new species. A little examination, of the *Flora Laponica* in particular, would have prevented this error, though all writers upon European plants have hitherto confounded the two species in question.

2. *T. alpina*. Alpine *Tofieldia*. Sm. MSS. n. 2. (*T. palustris*; Redout. Liliac. t. 256. *Narthecium iridifolium*; Villars Dauph. v. 2. 225. *N. calyculatum*; Allion. Pedem.

## TOFIELDIA.

v. 2. 165. Poiret in Lamarek Dict. v. 4. 431, the synonyms confuted. Phalangium alpinum palustre, iridis folio; Tourn. Inst. 368. Segu. Veron. v. 2. 61. t. 14, copied in Lamarek's t. 268. Pseudo-asphodelus secundus; Cluf. Hist. v. 1. 198. Asphodelus Lancastræ verus; Ger. Em. 96.)—Cluster cylindrical. Bractæas nearly equal in length to the flower-stalks. Stem smooth, bearing two leaves. Petals obovate. Germens oblong.—Very common in moist grassy pastures, or the margins of rivulets, on the Alps of Austria, Switzerland, Italy, Savoy and Dauphiny, flowering in August. We know not of its having ever been observed in Britain, notwithstanding the name in Gerarde's herbal, which is misapplied to the figure of this plant, and properly belongs to *Narthecium ossifragum*, exhibited in the preceding page of the same book. Linnæus knew the present species by its synonyms only, cited, with marks of well-founded doubt, in his *Fl. Lapp.* He was led by Dillenius to esteem it a mere variety of the foregoing, an opinion generally adopted ever since, but certainly for want of due enquiry. The *alpina* is not only twice the size of *palustris*, with a thicker more woody root, but the stem always bears two distant leaves. The flowers form a cluster, not a head or spike, from one to two inches long, often interrupted, with a concave bractæa at the base of each stalk, about its own length. Calyx close to the rest of the flower, rather slightly three-cleft. Petals more yellowish. Capsules oblong, combined almost all the way up, thrice as large as in *palustris*. As the fruit advances, the partial stalks become still more evident than in the flower.

3. *T. stenopetala*. Narrow-petalled Tofieldia. Sm. MSS.—Cluster cylindrical. Bractæas overtopping the calyx. Stem smooth, bearing two leaves. Petals lanceolate, acute.—Native of North America, where it was gathered by Kalm, whose specimens were referred by Linnæus to his *Narthecium calyculatum*. They more agree with our *T. alpina*, in size and habit, having two or three leaves on the stem. The cluster is dense and obtuse, an inch and a half long. Bractæas very different from that species, being lanceolate, and always as long as the partial stalk and calyx taken together; sometimes much longer. Calyx broad and shallow, unequally notched. Petals greenish-white, lanceolate, narrow and acute, not obovate. Anthers pointed. Germens tapering into styles twice the length of the foregoing. No doubt can exist of this being a most distinct species. We find no indications of it in the works of Michaux or Pursh, nor is its precise place of growth known.

4. *T. cernua*. Drooping-flowered Tofieldia. Sm. MSS. (*Anthericum* n. 39; Gmel. Sibir. v. 1. 73. t. 18. f. 2.)—Cluster cylindrical. Flowers drooping. Bractæas very short. Flower-stalks smooth, the length of the corolla. Stem leafless.—Found by Gmelin in mountainous woods in Siberia, flowering late in July. This is a species so evidently distinct from all the foregoing, that we cannot account for their having been confounded; except by supposing that Linnæus, not having specimens of each in fruit as well as in flower, too hastily considered the various appearances before him, as caused by different stages of growth. The drooping flowers, and quite pendulous fruit, of the present plant are remarkable at first sight; and the former are expressed in Gmelin's figure. These characters are too decided, in both our specimens, to be attributed to any accident in drying. The whole plant indeed is larger than any of the former three, with more creeping roots. Stem a foot high, or more, quite leafless, except at the very bottom, glaucous in the upper part. Leaves near three inches long, narrow, with a small oblique point, such as may be seen in some of the leaves of most of the species,

except *stenopetala*, whose foliage is peculiar for its long, straight, taper points. Cluster erect, smooth, two inches long while in flower, near four when in seed, rather lax, many-flowered, scarcely interrupted. Flower-stalks spreading, slender, scattered, about an eighth of an inch long, and still longer when the fruit is full-grown, having a little ovate bractæa at the base of each, about a quarter the length of the stalk. Flowers white, about twice the size of *Convallaria bifolia*. Calyx with three shallow lobes. Petals obovate, obtuse, slightly pointed, concave, the length of the flower-stalks, and keeping pace with them in their subsequent elongation. Stamens shorter than the corolla, with yellow, heart-shaped, pointless anthers. Germens ovato-lanceolate, with longish styles. Capsules shorter than the permanent corolla, obovate, membranous, but brittle, combined nearly all the way up, so as to form a turbinate three-lobed fruit, crowned with the three spreading styles and capitate stigmas. Seeds minute, prismatic.—Gmelin's supposed variety, taken from Steller, having a leafy stem, is probably another species. *T. cernua* is a very pretty plant, and we may hope that, in some of the frequent importations from Siberia, it may be introduced into the gardens of England.

5. *T. pubens*. Downy American Tofieldia. Dryandr. in Ait. Hort. Kew. n. 2. (*T. pubescens*; Pursh n. 2. *Narthecium pubens*; Michaux Bor.-Amer. v. 1. 209. *Anthericum filamentis lævibus*, perianthio trifido; Linn. Hort. Cliff. 140. Gron. Virg. ed. 1. 39. *Asphodelus minor albus*; Pluk. Mant. 29. Phyt. t. 342. f. 3.)—Cluster cylindrical, interrupted. Flower-stalks aggregate, rough, the length of the corolla.—Found in the moist meadows, and mossy boggy woods, of Virginia and Carolina, flowering in July, according to Clayton and Pursh. This is most like the last in stature and habit, but the roughness of the flower-stalks and their main stalk, essentially distinguishes it. The former grow three or four together, as if rather whorled than scattered. The flowers are white, with yellow anthers, and appear to be always erect.

6. *T. glutinosa*. Viscid Yellow Tofieldia. Pursh n. 3. (*Narthecium glutinosum*; Michaux Bor.-Amer. v. 1. 210.)—Cluster ovate, dense. Flower-stalks glutinous, rough, the length of the corolla. Anthers prominent, orbicular.—Gathered by Mr. Menzies on the west coast of North America. Michaux says his plant is found from Quebec to lake Mistassins. There is no room to suppose the latter different from our's, though the *Narthecium glutinosum* of Mr. Gawler, Curt. Mag. t. 1505, is very decidedly so, being a real and evident *Narthecium*, not, like Michaux's, a *Tofieldia*. Pursh calls it *N. americanum*, p. 227, which name, though not one of the best, we would substitute for *glutinosum* in our article NARTHECIUM, the plant not being glutinous. All reference to Michaux and his observations in that place are to be erased. The plant is, according to Pursh, a native of boggy fields and woods, on the pine-barrens, as they are termed, of New Jersey, flowering in June and July.

Our *Tofieldia glutinosa* has a tuberous horizontal root, with long simple fibres. Stem a foot high, angular, roughish all over with short glandular hairs, especially for two inches from the summit. Leaves few, almost entirely radical, four or five inches long, narrow, ribbed, smooth, except a little roughness towards the point. Cluster about an inch in length, of twelve or fourteen pale-yellow flowers, on hairy viscid stalks, about a quarter of an inch long, sometimes in pairs, having at the base one or two acute bractæas, one-third that length. Lobes of the calyx shallow. Petals obovate, rather shorter than the stamens. Anthers purplish, nearly

nearly orbicular, pointless. *Germens* ovate-oblong, tapering into longish *styles*, with small *stigmas*. The habit and hue of the plant are very similar to the European *Narthecium ossifragum* as well as to the *N. americanum* above-mentioned.

7. *T. frigida*. Wintry Tofieldia. Kunth Nov. Gen. et Sp. Pl. v. 1. 267.—Cluster lax, partly scattered. Flower-stalks smooth, twice the length of the bractæas. Petals rather acute. Stem smooth, with three distant ovate leaves towards the top.—Native of lofty summits of the Andes, in the kingdom of Quito, between Loxa and the village of Ona, where it was found, by the celebrated travellers Von Humboldt and Bonpland, flowering in December. Having seen no specimen of this, we can only extract its characters from the description of our able friend Mr. Kunth, who unluckily was not acquainted with the technical differences of the other species, so that his specific character answers nearly equally well to any one of the genus. The root is perennial, perpendicular, branched. Stem about a foot high, round, smooth, bearing in its upper part three ovate, acute, smooth, distant leaves, called by Mr. Kunth *bractæas*. Radical leaves two-ranked, sword-shaped, ribbed, smooth, rigid, three or four inches long. Cluster (erroneously termed *spica*) solitary, erect, two inches long. Flowers on solitary partial stalks, which are smooth, round, two lines in length, with an ovate acute *bractæa*, half as long, at the base of each. Calyx in three deep, ovate, acute segments, one-fourth as long as the oblong, sharpish, striated, whitish petals. Stamens shorter than the corolla, smooth, with oblong upright anthers. *Germens* combined. The present species may perhaps be nearest akin to our *T. stenopetala*, differing essentially in having shorter *bractæas*, to say nothing of other distinctions, which the reader will detect by the above description.—The author speaks of *Tofieldia* as monogynous, taking the *styles* for *stigmas*, and not adverting, as it appears, to the partial separation of either the *germens* or *capsules*. Hence we must conclude that this separation is here less remarkable than in the other species, which brings the plant in question nearer to *Helonias*, the *calyx* being its only, though all-sufficient, distinction.

TOFSALA, in *Geography*, a town of Sweden, in the government of Abo, on an island; 20 miles W.N.W. of Abo.

TOFT, TOFTUM, or *Testa*, in our *Law-Books*, a parcel of land, or a place where a messuage hath stood, but is decayed, or casually burnt, and not re-edified.

TOFT also signifies a grove of trees.

TOFTA, in *Geography*, a small island in the Baltic, E. of the island of Aland. N. lat. 60° 13'. E. long. 20° 7'.

TOFTS, KATHARINE, in *Biography*, an English singer of great renown on our stage at the beginning of the last century. In 1703, she sung at a subscription concert in Lincoln's-Inn theatre, several Italian and English songs. This lady was the constant rival of Margarita de l'Epine.

In 1704, she sung at the subscription music in Drury-lane playhouse; and soon after, signora Margarita sung for the first time at the same theatre. At her second appearance, there was a disturbance while she was singing, which, from the natural, and, it is to be feared, not uncommon effects of rival malice, was suspected to have been created by the emissaries of Mrs. Tofts; an idea the more difficult to eradicate, as the principal agent had happened to live with that lady as a servant. But as the law of retaliation is frequently practised on the like occasions by the injured party, it was thought necessary, a few days after, to insert a paragraph and letter in the Daily Courant, February 8, 1704, in vindication of Mrs. Tofts.

She was the principal singer in Clayton's *Arfinoe*, in

1705, the first opera attempted in our country and language on the Italian model. See CLAYTON.

Mrs. Tofts was likewise the heroine of the famous opera of Camilla, of Addison's *Rosalind*, set by Clayton, and Thomyris, adjusted to Italian music, and wholly to English words, till the arrival of Valentini, in 1707, the first male soprano singer that ever appeared on our stage; when Camilla and Thomyris were performed, half in English and half in Italian. And even after the arrival of the celebrated Nicolini, when a new opera, entitled *Pyrrhus* and *Demetrius*, was brought on the stage in 1708, in which almost all the characters were filled up by Italians, Mrs. Tofts continued to perform her part in English, as did Ramondon and Cook; but the public seemed perfectly satisfied with the motley performance, which had a run of eighteen nights; and the confusion of tongues, concerning which Mr. Addison is so pleasant in the *Spectator*, seems to have been tolerated with perfect good humour by the public, which, in music as well as words, seemed to care much less about *what* was sung, than *how* it was sung.

After the year 1709, when the whole opera, poetry, musical composition and performers were Italian, Mrs. Tofts, who seems to have endeared herself to an English audience by her voice, figure, and performance, more than any preceding singer of our country, retired.

Colley Cibber, though he does not speak of music *en connoisseur*, and, as an English actor and patentee of a theatre, was an enemy to Italian operas and Italian singers upon a principle of self-defence, probably gives us the general and genuine opinion of his acquaintance concerning Mrs. Tofts, who, he says, had her first musical instructions in her own country, "before the Italian taste had so highly prevailed, and was then not an adept: whatever defect the fashionably skilful might find in her manner, she had, in the general sense of her hearers, charms that few of the most learned singers ever arrive at. The beauty of her fine proportioned figure, and exquisitely sweet silver-tone of voice, with peculiar rapid swiftness of her throat, were perfections not to be imitated by art or labour."

This performer had songs given to her in all styles; her compass, however, did not surpass the common limits of a soprano, or treble voice. With respect to her execution, of which we are still enabled to judge by the printed copies of her songs, it chiefly consisted in such passages as are comprised in the shake, as indeed did that of most other singers at this time.

Mrs. Tofts quitted the stage in 1709. The talents of this singer and of Margarita de l'Epine gave rise to the first musical factions which we hear of in this country. According to Hughes, author of the *Siege of Damascus*, their abilities were disputed by the first people in the kingdom.

"Music has learn'd the discords of the state,  
And concerts jar with Whig and Tory hate.  
Here Somerset and Devonshire attend  
The British Tofts, and ev'ry note commend;  
To native merit just, and pleas'd to see  
We've Roman arts, from Roman bondage free.  
There sam'd l'Epine does equal skill employ,  
While list'ning peers crowd to th' ecstasie joy:  
Bedford to hear her song his dice forsakes,  
And Nottingham is raptur'd when she shakes;  
Lull'd statesmen melt away their drowy cares  
Of England's safety, in Italian airs."

Although it is publicly insinuated in the *Tatler*, for Thursday, May 26, 1709, that Mrs. Tofts was insane, it seems doubtful whether we are to take this account literally, or whether

whether fir Richard Steele had not recourse to invention, or at least exaggeration, in order to throw a ridicule on opera quarrels in general, and on her particular disputes at that time with the Margarita or other female singers. See Tatler, N<sup>o</sup> 20.

After quitting the stage, by which she is said to have acquired a considerable fortune, she married Mr. Joseph Smith, who was afterwards appointed consul at Venice, where he resided till the time of his death, about the year 1770. He was a great collector of books and pictures, and a patron of the arts in general.

TOGA, in *Ancient Geography*, a town of Asia, in Greater Armenia. Ptol.

TOGA, in *Antiquity*, a wide woollen gown, or mantle, without sleeves, used among the Romans, both by men and women.

In process of time, none wore the toga but lewd women: whence that of Horace, in *matrona, ancilla, peccesse togata*. Lib. i. sat. ii. ver. 63.

The toga was of divers colours, and admitted of various ornaments: there was that called *toga domestica*, worn within doors; *toga forensis*, worn abroad; *toga militaris*, used by soldiers, tucked up after the Gabinian fashion; and *toga picta*, or *triumphalis*, wherein the victorious triumphed: this was embroidered with palms: that without any ornaments was called *toga pura*.

The *toga picta*, &c. was an ancient habit of the Etruscans, and not brought to Rome till after Tarquinius Priscus had subdued the twelve states of that nation.

The toga was sometimes worn open, and called *aperta*; sometimes girt or tucked up, called *præcinctâ*; and this cincture or girding, again, according to Sigonius, was of three kinds; *laxior*, or the loose kind, where the tail trailed on the ground; *adstrictior*, the close kind, wherein it did not reach so low as the feet; and *Gabinia*, where one of the skirts or lappets was girt round the body.

Sigonius distinguishes the several togæ, or Roman gowns, into *pura*, *candida*, *pulla*, *picta*, *prætexta*, *trabea*, and *paludamentum*. See PRÆTEXTA, PALUDAMENTUM, &c.

The *toga pura* was also called *virilis*. Kennet's Rom. Ant. part ii. c. 8.

TOGA is sometimes used metaphorically for peace. See TROPE.

TOGÆ, *Jus*, or privilege of the toga, was the same with the privilege of a Roman citizen, *i. e.* the right of wearing a Roman habit, and of taking, as they explain it, fire and water through the Roman empire.

TOGAWADY, in *Geography*, a town of Hindoostan, in Baramaul; 7 miles S. of Sankerydurgam.

TOGDA, or TOGGA, a town and district of Africa, in the country of Sugulmeffa; 50 miles W. of Sugulmeffa.

TOGEBAUT, a town of Persia, in the province of Irac; 81 miles N. of Ispahan.

TOGETHER, in *Sea Language*, the order given to the men in the exercises of heaving, rowing, twisting, &c. to act all in concert, or at the same instant.

TOGGEL, in a *Ship*, a small wooden pin, about five or six inches long, and usually tapering from the middle toward the extremities. It is used to fix transversely in the lower part of a tackle, in which it serves as a hook whereby to attach the tackle to a stop, slings, or any body in which the effort of the tackle is to be employed.

There are also toggels of another kind, employed to fasten the top-gallant sheets to the span, which is knotted round the cap at the top-mast-head. Filchner See BECKETS.

TOGGENBURG, in *Geography*, a county of Swit-

zerland, dependent on the abbey of St. Gal, bounded on the N. by the territory of St. Gal, on the E. by the canton of Appenzell, on the S. by the county of Sargans and the territory of Caster, and on the W. by the canton of Zurich. In its natural quality it resembles Appenzell and the other cantons, and, being full of fertile Alps, abounds in numerous breeds of cattle. Till the year 1436, this county had its own counts; the last of whom carried his indulgence to his vassals so far, as to grant them such privileges as nearly amounted to a state of absolute freedom: accordingly, on his demise in the above year, they entered into a close alliance with the cantons of Schwytz and Glaris, which alliance was confirmed in 1440. Afterwards, the county descended to the barons of Raron; but, in 1468, they sold it to Ulrich VIII. abbot of St. Gal, who, in 1469, entered into a perpetual league with the cantons of Schwytz and Glaris, and likewise gave his sanction to the former compact between the inhabitants of the county and the said cantons. In the beginning of the eighteenth century, the Toggenburgers, resenting the illegal and oppressive exactions of abbot Leodegarius, applied for assistance to their allies, who readily granted it; and, in 1707, Zurich and Bern also declared, that they would maintain the county of Toggenburg in the secure enjoyment of its rights and liberties, against all illicit violence whatsoever. On this the people began to assert their rights, and, in 1707, in a solemn landesgemeine, held at Watweil, renewed their federal oath, and erected three councils, named the great, lesser, and privy, which are composed of an equal number of members of both sects. The intestine commotions here continued however to increase, till, in 1712, they broke out into open war, in which Zurich and Bern sided with the county, and Schwytz and Glaris with the abbot. In 1718, at Baden, in the Argau, an accommodation, confirming the liberties of the county, was brought about between the new abbot and the cantons of Bern and Zurich. Pursuant to this peace, the abbot and prince of St. Gal both is, and bears the title of, natural sovereign, and territorial lord of the county of Toggenburg; and the people are to take the accustomed oath to him, and to pay him suitable services, but without any violation of their rights and liberties.

TOGLUPOUR, a town of Hindoostan, in the subah of Delhi; 15 miles W.N.W. of Pannipur.

TOGOMI, a town of Japan, in the island of Niphon; 80 miles N.W. of Meaco.

TOGOSOHATCHEE CREEK, a branch of the Oakmulgee river, in the state of Georgia.

TOGRIN, CAPE, a cape at the mouth of the river Sierra Leone.

TOGULA, among the Romans, a narrow kind of toga, used by the poorer sort of people.

TOHBA, a denomination given to a class of priests in Thibet. Youth intended for the monastery of Teschooloomboo, are, upon their first being admitted, at the age of eight or nine years, into the establishment, called "Tuppa," and they are then occupied in receiving the instructions suited to their age, and the duties for which they are designed. At fifteen they are usually admitted into the order of Tohba, the first step in their religious class, and after due examination, they are advanced from the order of Tohba to that of Gylong, between the age of twenty-one and twenty-four. See GYLONG.

TOHOTCHIE HOTUN, in *Geography*, a town of Chinese Tartary, in the country of Hami; 30 miles N.W. of Hamilhotun.

TOJIE, a town of Hindoostan, in Candish; 10 miles N. of Hurdah.

TOIKO,

**TOIKO**, a town of Japan, in the island of Nippon; 80 miles E.S.E. of Jedo. N. lat.  $36^{\circ} 5'$ . E. long.  $140^{\circ} 40'$ .

**TOILES**, snares or nets set by hunters for catching of wild beasts; as deer, &c.

**TOILET**, a fine covering, of linen, silk, or tapestry, spread over the table in a bed-chamber, or dressing-room, to undress and dress upon.

The dressing-boxes, in which are kept the paints, pomatums, essences, patches, &c. the pin-cushion, powder-box, brushes, &c. are esteemed parts of the equipage of a lady's toilet.

That of the men consists of comb-case, brushes, &c.

To make a visit to one at his toilet, is to come to entertain him while he is dressing or undressing.

Sattin, lace, velvet, brocade, point de France, &c. are now ordinarily used for toilets: anciently they were made much plainer: whence the name, which is formed from the French, *toilette*, a diminutive of *toile*, any thin stuff.

**TOISE**, or **FATHOM**, a long measure in France, containing 6 feet, the foot being 12 inches, the inch 12 lines, subdivided into 12 points: 76 French feet are equal to 81 English feet, or, more accurately, 4000 French feet equal 4263 English feet.

**TOISON d'Or**, a term, in *Heraldry*, for a golden fleece, which is sometimes borne in a coat of arms.

**TOISSEY**, in *Geography*, a town of France, in the department of the Ain, near the Chalarogne and Saône, which unite about half a mile from the town; 18 miles W. of Bourg-en-Bresse.

**TOJUCA**, a river of Brazil, which runs into the Atlantic, S. lat.  $27^{\circ} 44'$ .

**TOKA**, a town of Hindoostan, in the circar of Aurungabad; 33 miles S.W. of Aurungabad.

**TOKAI**, a river of Bucharja, which runs into the Gihon, near Hefdrasp.

**TOKARESTAN**, a district of Grand Bucharja, situated to the eastward of Balk.

**TOKAY**, a town or rather village of Hungary, situated at the foot, and to the E. of a high hill, close by the conflux of the river Bodrug with the Theis or Tibiscus. The inhabitants are chiefly either Hungarians of the Protestant religion, or Greeks, who came originally from Turkey, but have been long settled here, for the purpose of carrying on the wine-trade. The hills on which the vine grows lie all to the W. of the river Bodrug, and beginning close by the town of Tokay, extend westward and northward from thence, and occupy a space of perhaps ten English miles square; but they are interrupted and interspersed with many extensive plains, and several villages. Near some of these, particularly Tabia and Tarczal, the wine is better than that which is produced on the hill of Tokay; but it all goes under the same name; 98 miles N.W. of Colofvar. N. lat.  $48^{\circ} 10'$ . E. long.  $10^{\circ} 57'$ .

**TOKAY-Wine**, derives its name from the town or village of Hungary, where it is produced. (See the preceding article.) The vineyards extend beyond the forty-eighth degree of northern latitude; the soil where the vines grow is a yellow clayish earth, extremely deep, and interspersed with large loose lime-stones: the exposures most inclining to the south, the steepest declivities, and the highest parts of these, produce the best wine. This wine, so far from its being found in so small a quantity as never to be genuine, unless when given in presents by the court of Vienna, is a common desert wine in all the great families at Vienna and in Hungary, and is very generally drank in Poland and Russia: nor is the Tokay wine altogether the property of the crown, but many of the German and Hungarian nobility, as well as gen-

tlemen, and even peasants, have vineyards at Tokay. The grapes are all white, and the vintage commonly begins about the 28th of October, sometimes as late as the 11th of November. There are four sorts of wine made from the same grapes, distinguished at Tokay by the names of essence, ausruch, maßsach, and the common wine.—

The essence is made by picking out the half-dried and shrivelled grapes, and putting them into a perforated vessel, where they remain as long as any juice runs off by the mere pressure of their own weight. This is put into small casks. The ausruch is made by pouring the expressed juice of the grapes from which the former had been picked on those that yielded the essence, and treading them with the feet. The liquor thus obtained stands for a day or two to ferment, and then is poured into small casks, which are kept in the air for about a month, and afterwards put into the cellars. The same process is again repeated by the addition of more juice to the grapes which have already undergone the two former pressures, and they are now wrung with the hands; and thus is had the maßsach. The fourth kind is made by taking all the grapes together at first, and submitting them to the greatest pressure: this is chiefly prepared by the peasants. The essence is thick, and very sweet and luscious; it is chiefly used to mix with the other kinds. The ausruch is the wine commonly exported, and which is known in foreign countries by the name of Tokay. The goodness of it is determined by the following rules. The colour should neither be reddish nor very pale, but a light silver: in trying it, the palate and tip of the tongue should be wetted without swallowing it, and if it manifest any acrimony to the tongue, it is not good; but the taste ought to be soft and mild: when poured out, it should form globules in the glass, and have an oily appearance: when genuine, the strongest is always of the best quality: when swallowed, it should have an earthy astringent taste in the mouth, which is called the taste of the root. All Tokay wine has an aromatic taste, which distinguishes it from every other species of wine. It keeps to any age, and improves by time; but is never good till about three years old. It is the best way to transport it in casks; for when it is on the seas, it ferments three times every season, and thus refines itself. When in bottles, there must be an empty space left between the wine and the cork, otherwise it would burst the bottle. A little oil is put upon the surface, and a piece of bladder tied over the cork. The bottles are always laid on their sides in sand. Phil. Trans. vol. lxxiii. part ii. p. 292, &c.

**TOKE**, in *Geography*, a town of Bengal; 35 miles N.N.E. of Dacca.

**TOKEN-BESSEYS**, a cluster of small islands in the East Indian sea. S. lat.  $6^{\circ}$ . E. long.  $123^{\circ} 36'$ .

**TOKENS**, in *Pestilential Cases*, those livid spots which appear in the several stages of the disease, and are certain forerunners of death. They generally appear only under the most desperate circumstances, and when the patient would otherwise be declared dying; but Hodges gives us instances where they appeared before any other symptoms of the disease, and came out without any pain or trouble; yet even in these cases the person always died. These tokens are the mark by which the searchers conclude of the cause of the death of the person, and are the rule for ordering the house to be shut up, to prevent the spreading of the disease. But the nurses, and other crafty people, have a way of disguising the symptom after death; by covering the body with wet and cold sheets. These strike in the spots, so that the person may be thought to have died by some other disease.

**TOKENS**, *False*, in *Law*. See **FALSE**.

**TOKENS**, in *Coinage*, coins in the reign of queen Elizabeth,

struck in the cities of Bristol, Oxford, and Worcester, and also by about 3000 tradefmen and others; upon returning which to the issuer, he gave current coin, or value, for them, as desired. In the succeeding reign, on the 19th of May, 1613, king James's royal farthing tokens commenced by proclamation. These were not forced upon the people as farthings or established coin, but merely as pledges or tokens, for which government was obliged to give other coin if required. Their legend was the king's common titles running upon each side. These pieces were not favourably received, but continued in a kind of reluctant circulation through the whole of this reign, and the beginning of the succeeding. In 1635, Charles I. struck those with the rose instead of the harp. But the vast number of counterfeits, and the king's death in 1648, put an utter stop to their currency; and the tokens of towns and tradefmen again took their run, increasing prodigiously till the year 1672, when farthings properly so called were first published by government. These town-pieces and tradefmen's tokens, together with those of the time of queen Elizabeth, are collected by some antiquaries with great avidity. Similar tokens, says Pinkerton, are to this day current in Scotland, both of copper and tin, principally used by the bakers and grocers; farthings not being very common in that country.

In 1804, the bank of Ireland bought in a large quantity of depreciated silver coin; and, as a substitute, issued Spanish dollars, newly stamped, at 6s. Irish, and also fractions of the dollar, which had been minted for the occasion at the Tower of London, consisting of five-penny, ten-penny, and thirty-penny pieces Irish, being exactly  $\frac{1}{4}$ ,  $\frac{1}{2}$ , and  $\frac{3}{4}$  of the dollar. All these coins are called Bank tokens, the Bank having engaged to receive them again at the issued price, and they have been declared a legal tender in the payment of taxes: their intrinsic value may be known from that of the dollar. In 1809, a new silver coinage was minted at the Tower of London for the colonies of Essequibo and Demerary, consisting of pieces of 3, 2, 1,  $\frac{1}{2}$ , and  $\frac{1}{4}$  guilders: the larger piece weighs 15 dwt., and is 1 oz. 6 dwt. worse than English standard. Its value therefore is 3s. 5d. sterling, or, computing it as the dollar is now rated in the West Indies (*i. e.* at 4s. 8d.), its value is 3s. 8 $\frac{1}{4}$ d. and the smaller pieces in proportion. They are marked on the reverse "Colonies of Essequibo and Demerary Token," and the king's is on the obverse. The exchange with London should be about 12 guilders for 1l. sterling, but varies considerably above this, even to 20 guilders, and upwards. Kelly's Cambist.

TOKIS, in *Geography*, a town of Japan, in the island of Nippon; 40 miles N.N.E. of Meaco.—Also, a town of Japan, in the province of Ximo; 15 miles N.N.W. of Nangafaki.

TOKI-TAO, a small island near the coast of China. N. lat. 38° 7'. E. long. 120° 39'.

TOKORARI. See TOCORARY.

TOKTABA, a town of Bootan; 50 miles N. of Beyhar.

TOL, in *Law*, a term signifying to defeat, or take away. From the Latin, *tollere*, which signifies the same.

Thus, *to tol the entry*, is to take away the right of entry.

TOL *Peden Penwith*, in *Geography*, a cape on the S. coast of the western extremity of Cornwall; 3 miles S.E. of Land's End. N. lat. 50° 4'. W. long. 5° 36'.

TOLA, in *Commerce*, a weight for gold and silver at Bombay, Surat, and other places in India: at Bombay, the tola contains 40 valls, 100 gonze or Bombay grains, or 600 chowes. The tola is equal in weight to the silver rupee;

24 tolas make 1 seer, and 32 tolas 13 valls = 1 lb. troy. At Surat, the tola contains 32 valls or 96 ruttees: 82 $\frac{1}{2}$  valls make 1 oz. troy, and therefore 31 tolas 1 lb. troy nearly.

TOLABO, CAPE, in *Geography*, a cape on the E. coast of Cekbes. S. lat. 0° 45'. E. long. 122° 50'.

TOLAGO BAY, a bay on the N.E. coast of the northern island of New Zealand, in the South Pacific ocean, discovered by captain Cook in the year 1769. It is moderately large, and has from seven to thirteen fathom, with a clean sandy bottom and good anchorage, and is sheltered from all winds except the north-east. On the south point lies a small but high island, so near the main as not to be distinguished from it. Close to the north end of the island, at the entrance into the bay, are two high rocks; one of which is round, like a corn-stack, but the other is long, and perforated in several places, so that the openings appear like the arches of a bridge. Within these rocks is a cove, convenient for wood and water. Off the north point of the bay is a pretty high rocky island; and about a mile without it, are some rocks and breakers. The tide flows at the full and change of the moon, about six o'clock, and rises and falls perpendicularly from five to six feet. Captain Cook saw no four-footed animals, nor the appearance of any, either tame or wild, except dogs and rats, and these were very scarce: the people eat the dogs, as at Otaheite, and adorn their garments with the skins. He climbed many of the hills, hoping to get a view of the country, but could see nothing from the top except higher hills, in a boundless succession. The ridges of these hills produce little besides fern; but the sides are most luxuriantly clothed with wood and verdure of various kinds, with little plantations intermixed. In the woods he found trees of above twenty different sorts, and carried specimens of each on board; but there was nobody to whom they were not altogether unknown. The tree cut for firing was somewhat like the maple, and yielded a whitish gum. Another sort was found of it, of a deep yellow, which might be useful in dyeing. One cabbage-tree was met with, and cut down for the cabbages. The country abounds with plants, and the woods with birds in an endless variety, exquisitely beautiful, and of which none of them had the least knowledge. The soil of both the hills and vallies is light and sandy, and very fit for the production of all kinds of roots; though none were seen except sweet potatoes and yams. S. lat. 38° 22'. W. long. 181° 15'.

TOLAND, JOHN, in *Biography*, a writer on subjects of political and religious controversy, was born in the year 1669, in Ireland, near Londonderry; and his parents, of a good family, were Roman Catholics. Educated in the principles of his family, he renounced them before he attained the age of sixteen years, and became a zealous opposer of popery. Accordingly he completed his education in Scotland, and having spent three years in the university of Glasgow, removed to Edinburgh, where he graduated M. A. in 1690. From Edinburgh he removed to London, and became acquainted with some respectable dissenters, who enabled him to pursue his studies for two years more at Leyden. On his return to London, he visited Oxford, and here he collected materials for the execution of some literary projects: one of which was a dissertation in order to prove that the common narrative of the death of Regulus was a fable. In 1696 he published at London his "Christianity not mysterious; or a Treatise shewing that there is nothing in the Gospel contrary to Reason, or above it; and that no Christian Doctrine can be properly called a Mystery." This publication caused an alarm, and not without reason,  
among

among Christians of all denominations, by whom it was regarded as an attempt to overthrow revealed religion. At home and abroad it excited attention, and the advocates of Christianity concurred in the defence of their religion against what they conceived to be an attack upon it. The magistrates, also, intruded into this controversy, and procured a presentment by the grand jury of Middlesex. The author withdrew from the storm which seemed to be gathering into his own country; but the obnoxious character of his book had excited prejudices against him. Toland, as we learn from the correspondence between Mr. Molyneux and Mr. Locke on the subject, does not seem to have acted with that moderation and prudence which might reasonably have been expected in his circumstances. His manner of defending and propagating his opinions gave just offence even to those who entertained some degree of respect for his talents and learning; and was condemned by those who were avowed advocates of rational liberty and enemies to every kind of persecution. From another quarter he experienced a severity of treatment, which his own misconduct had provoked, but which, in this more enlightened and liberal period, none, we presume, will undertake to justify. In a reply to Toland's book, by Mr. Peter Brown, senior fellow of Trinity college, the civil magistrate was called upon to interfere; accordingly the grand jury of Dublin made a presentment of the book: the parliament of Ireland voted it to be burnt by the common hangman, and issued an order that the author should be taken into custody by the serjeant at arms, and prosecuted by the attorney-general. Toland, universally shunned by his acquaintance, and reduced to pecuniary distress, left the country, and returned to England. While some disapproved the violence of this proceeding, others justified it; and Dr. South, in particular, highly commends the Irish parliament for having, "to their immortal honour, presently sent him (Toland) packing, and, without the help of a faggot, soon made the kingdom too hot to hold him." On the spirit which dictated this language we make no comment. Toland, upon his arrival in London, published an account of his treatment in Ireland, and renouncing communion with the Dissenters, declared himself a latitudinarian, or one who would comply with the religious worship of any class of Protestants, whose differences were not, in his estimation, of sufficient importance to justify disturbing the peace of a nation. He then directed his attention to other topics; and in 1698 he published a pamphlet, intitled "The Militia reformed," in which he proposed to substitute that species of armament to a standing army. In the same year he wrote a "Life of Milton," to be prefixed to an edition of his prose works, and which was also printed separately. In this preface he opposed the notion then prevalent, that the "Icon Basilike" was written by Charles I.; and from the consideration of this imposture, as he pronounced it to be, he digressed to the consideration of the spurious works that had been ascribed to Christ and his apostles. Against a host of political and religious adversaries, he defended himself in a treatise intitled "Amyntor;" in which he gave a complete history of the "Icon Basilike," and also a catalogue of such primitive writers, who were judged by him to be spurious. As he was supposed in the discussion of this latter topic to impugn the authenticity of the received canon of Scripture, he drew forth replies from some of the ablest advocates of Christianity, and particularly Mr. (afterwards the highly celebrated Dr.) Samuel Clarke.

In 1699, Toland was engaged by the duke of Newcastle to publish "Memoirs of Denzil Lord Holles;" and in the following year by Mr. Robert Harley, afterwards earl of Oxford, then a Whig, to give a new edition of

Harrington's "Oceana." When the Act of Succession was passed, on occasion of the death of the duke of Gloucester in 1701, he published "Anglia Libera," being an explanation and eulogy of this act; and he accompanied the earl of Macclesfield, who was deputed to carry it to Hanover, and had the honour of presenting his book to the electress Sophia, and of kissing her hand on the occasion. At Berlin, which he visited, he held a dispute, before the queen of Prussia, with the learned Beaufobre, on the authority of the books of the New Testament; an account of which was sent by the latter to the "Bibliothèque Germanique." Upon his return to England in 1704, he published "Letters to Serena," (meaning the queen of Prussia,) on the origin and force of prejudices; the history of the soul's immortality among the heathens; the origin of idolatry; and remarks on Spinoza's philosophy. These letters were animadverted upon by Wotton, and by the author of the Divine Legation. In 1708 he published at the Hague two Latin dissertations, entitled "Adei-fidæmon, sive Titus Livius a Superstitione vindicatus," and "Origines Judaicæ, sive Strabonis de Moyses et Religione Judaica Historia breviter illustrata." In 1718 he published "Nazarenus; or Jewish, Gentile, or Mahometan Christianity," &c. in which he endeavours to shew that the Jewish converts were to observe their own law throughout all generations, &c. Two years afterwards appeared a Latin tract, entitled "Pantheisticon: sive Formula celebrandæ Sodalitatis Socraticæ, &c.:" a work which has subjected its author to the charge of atheism, and in consequence of which he was unjustly accused by Dr. Hare with having composed a profane prayer to Bacchus in his character of Pantheist. In the same year he published his "Tetradymus," on the pillar of cloud and fire that guided the Israelites; on the exoteric and esoteric philosophy of the ancients; on Hypatia, the female philosopher; and a defence of his Nazarenus against Dr. Mangey. To this work he annexed an account of his conduct and sentiments, solemnly professing his preference of the Christian religion, pure and unmixed, to all others.

Toland's health was now declining, and being in low circumstances, lord Moleworth assured him that he should never want, while he himself lived. However, his disease baffled all remedies, and his life closed on the 11th of March, 1722, in the 53d year of his age. He manifested a considerable degree of resolution and patience during the progress of his illness: replying to one who asked him if he wanted any thing, "I want nothing but death;" and after taking a calm leave of his friends, saying to them that "he was going to sleep." In an epitaph which he prepared for himself, he expresses that confidence and self-applause which belonged to his character. He closes with these words: "Spiritus cum æthereo patre, a quo prodiit olim, conjungitur; corpus item; naturæ cedens, in materno gremio reponitur. Ipse vero æternum est resurrecturus, at idem futurus Tolandus nunquam." His posthumous works were published in 2 vols. 8vo. in 1726, and again in 1747, with an account of his life and writings, by Des Maizeaux. Biog. Brit.

TOLANORE, in *Geography*, a town of Hindoostan, in the Carnatic; 5 miles N. of Volconda.

TOLASTRA REGIO, in *Ancient Geography*, a country of Asia, in Galatia. Ptolemy.

TOLBIACUM, a town of Gallia Belgica, according to Tacitus; situated on the route from Trevari to Colonia Agrippina.

TOL-BOOTH, or TOLL-BOOTH, a place in a city, where goods are weighed, to ascertain the duties or import on them.

TOLCESTER, *TOLCESTRUM*, in our *Old Writers*, an old excise, or duty paid by the tenants of some manors to the lords, for liberty to brew and sell ale.

TOLCKSDORF, in *Geography*, a town of Prussia, in Ermeland; 12 miles S.E. of Frauenburg.

TOLEDO, in *Biography*. See ALVA.

TOLEDO, in *Geography*, a city of Spain, in New Castile, on the Tagus, the see of an archbishop, and an university, founded in the year 1475. The origin of Toledo is uncertain; it is only known to have been a Roman colony, and made the depository of the treasures sent to Rome. From the Romans it passed under the dominion of the Goths; Leovigild resided there and embellished the city, which became more considerable under his successors. The Moors took Toledo in 714, and reigned there till 1085, when it was taken from them by Alphonso VI., who styled himself emperor of Toledo, whence it took, and has preserved, the title of royal and imperial. Toledo, as is well known, was formerly famous for the exquisite temper of the sword-blades made there; and the genuine ones that still remain are sold at an exorbitant price. It is said that the secret of hardening them has been again recovered; and experiments have been made with blades lately fabricated there which seem to justify this assertion. When one of these has undergone the operation of tempering, if it be in the least notched, by striking with it several violent blows on an iron head-piece, it is rejected: almost all that are made here, it is said, will stand this proof. Two centuries ago, Toledo contained more than 200,000 inhabitants, but now scarcely 30,000. When a house falls to decay, it is never rebuilt; and in 20 years more, this city will be little else than a heap of ruins. Toledo is built upon rocks, and commanded by eminences which seem to present the image of sterility; yet, in the midst of these precipices, the traveller finds, to his surprise, several fertile and charming situations, impenetrable to the burning rays of the sun. These places are called *Cigarrales*. Several councils have been held at Toledo, particularly one in 633, in which it was declared unlawful and unchristian to force people to believe, seeing it is God only who hardens, and shews mercy to whom he will; but by another council in a few years after, they highly commended their monarch for persecuting the Jews. In 681 it was decreed, that the archbishop of Toledo should have power to create bishops throughout Spain in the king's absence, and confirm those made by the king. In 1355, it was seized by Henry and Frederick, the bastards, brothers of king Peter, who robbed all the Jews, and murdered about 1000 of them; 32 miles S.S.W. of Madrid. N. lat. 39° 56'. W. long. 4° 18'.

TOLEN, a town of Norway; 22 miles W. of Berga.—Also, an island belonging to the state of Zealand, in the east branch of the Scheldt, separated from the main land of Brabant by a canal, about ten miles in length, and four in breadth. It contains two towns, Tolen and St. Martyn's Dyck, and several villages. Tolen, the capital, from whence the island itself is named, is a handsome town, and ranks as fourth in the assembly. The name of it is derived from the toll which was formerly paid here by order of the counts of Zealand. It is fortified with seven bastions, and the states have caused a fort, called Sackenburgh, to be built on the other side of the river, so that it is now one of the strongest frontier towns of the state of Zealand. The stadt-houfe is an old building, which makes a good show. The arsenal is situated at the entrance of the small harbour; there is also a magazine for powder. The church is built in the figure of a cross, and is an extraordinary piece of architecture; 4 miles N.W. of Berg-op-Zoom. N. lat. 51° 36'. E. long. 3° 58'.

TOLENTINO, a town of the Popedom, in the marquisate of Ancona, on the Chiento, the see of a bishop,

united to Macerata. It is only remarkable for being the depository of the body of St. Nicholas, where the arm, by bleeding afresh, prognosticates when any signal calamity is to befall Italy; 18 miles W. of Fermo. N. lat. 43° 10'. E. long. 13° 18'.

TOLENTINUM, in *Ancient Geography*, a town of Italy, in Picenum, S.W. of Ricina.

TOLENUS, a river of Italy, in the country of the Marfi.

TOLERATION, in *Religion*, a term which has engaged much attention in the disputes among Protestants.

M. Bafnage, and some others, distinguish *civil* toleration from *ecclesiastical*. The latter allows of different, and even opposite sentiments in the church; and the first permits them in civil society.

By civil toleration, is meant impunity and safety in the state for every sect which does not maintain any doctrine inconsistent with the peace and welfare of the state. This *civil* or *political* toleration, implies a right of enjoying the benefit of the laws, and of all the privileges of the society, without any regard to difference of religion.

*Ecclesiastical* toleration is an allowance of certain opinions, which, not being fundamentals, do not hinder those who profess them from being esteemed members of the church. But as to the quality and number of these fundamental points, they never could, nor in all probability ever will be agreed upon.

In order to discover the genuine principles of toleration, it is necessary to consider that, antecedently to the formation of civil societies, mankind possess certain rights, independent of all human grant, not derived from any compact, and which are therefore to be acknowledged as the rights of human nature. A right to judge for themselves in points of religion is one of these rights; which, whilst it authorizes every individual to claim the exercise of this privilege to himself, obliges him to allow it in the same extent to all about him, and establishes one uniform regulation for his behaviour toward others, and their behaviour toward him: e. g. no apprehensions of the truth and certainty of any person's religious sentiments can justify him in attempting to impose them on his neighbour; for the same right of judgment which any one can claim, belongs, on the same principle, equally to all, and ought to be equally sacred and inviolable in all; and no reason can be alleged by him for taking the religious liberty of others from them, but what will, at the same time, equally destroy his own title to it. The injustice of similar encroachments upon him from others follows from the same principle, and with the same evidence.

Whether the claim of such a liberty of judgment in religion for ourselves is weakened by men's entering into civil society, is the next object of consideration.

The great end of government is to protect the subjects of it from the injuries to which they were exposed in a state of nature; and as all injuries imply rights of which they are violations, and the care taken to guard against the violation of these rights is an acknowledgment of the reality and importance of them; it evidently follows, that when they enter into society, if the primary and leading view of government be to prevent or restrain those injuries, to which men were exposed for want of its protection, they carry these rights with them; that they continue to retain them; and that, instead of supposing themselves to be deprived of them, the very design with which they put themselves under the authority of government is to secure them the more firmly. With this view they entrust the preservation of them to common guardians, by whose intervention, it is presumed, they will be more vigorously asserted and more effectually protected, than it is possible they should be in a state where there

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there is no common empire to check the evils of oppression on the one hand, and restrain the no less formidable evils of immoderate resentment on the other.

If we consider what are the rights which men give up to government, when they enter into civil societies, they will be found to be, not those which may most properly be styled the primary rights of human nature; not the right which every man has to live undisturbed, to enjoy the advantages which he justly possesses, and to be left to his freedom in all things not injurious to his fellow-creatures; but the consequential, though equally real and certain right which, where men are not subject to government, every person has to take the assertion of all his rights into his own hands, and correct the infringers of them by the inflicting of such pains, or the use of such other methods of deterring the authors of the wrong, as reason shall warrant for his future security: and, speaking precisely, even these rights are not absolutely extinguished and utterly lost, but suspended by such limitations as the order and well-being of society require, and so long as the succours of government shall be effectual. The primary rights of liberty, safety, and protection from oppression, still subsist in their full vigour. To suppose them abandoned, renounced, and annihilated, or that government can have any right to destroy them, is ascribing to it a right to defeat the end for which it is established, and betray the trust reposed in it. It is, indeed, totally inverting the principle upon which the power of rulers stands, and by which the acts of it ought to be guided.

Man was not made for government, but government for man; and the great object, to which all the operations of it should be directed, is to guard, as much as possible, the equal, impartial ease and freedom of all the subjects of it. To this purpose judge Blackstone observes, that the principal aim of society is to protect individuals in the enjoyment of those absolute rights, which were vested in them by the immutable law of nature, but which could not be preserved in peace without that mutual assistance and intercourse, which are gained by the institution of friendly and civil communities: so that the primary end of human laws is to maintain and regulate these absolute rights of individuals. See GOVERNMENT and *Civil LIBERTY*.

Now of all the rights inherent in human nature, that of thinking for ourselves, and following the conviction of our own judgments in relation to the object of our faith, worship, and religious obedience, is the most sacred, incontestible, and in every view of it, intitled to the most careful protection. The preservation of these is one of the chief, perhaps the first end for which civil societies are instituted, and the rulers of them invested with power: and therefore, in all governments, the rights of conscience should have a principal place assigned them in the care of those, to whom the protection of their fellow-creatures is committed. If the securing of equal, impartial liberty, in all those instances of it in which it is not injurious to others, be so much the object of every equitable, wise, and well-constituted system of laws, that all needless encroachments upon it are deviations from the spirit which ought to be diffused through all laws, and impair the benefit which they ought to confirm, can it be supposed that the rights of conscience ought not to be guarded from violation? Rights of this kind are the last which men can ever be imagined to give up to be modelled at the pleasure of others; nor (as it is argued) is there any one principle connected with their submission to governors in other respects, that can require or justify such a surrender. Does it follow that, because the magistrate is entrusted with authority to decide disputes between us and our fellow-citizens concerning property, he is to determine

points which lie only between God and our own consciences? Because it is allowed to be his office to guard the peace of his subjects, and to inflict punishments for this purpose on those who unjustly disturb it; is it to be taken for granted, that he is to dictate to them what rule of faith they shall adopt, and in what manner they are to worship the Deity; when it is allowed on all hands, that of these things the will of God is the only rule, and that no worship can be acceptable to him, but what is accompanied with the sincere conviction of him who offers it? Besides, it is argued, that such is the nature of this right, and it so stands upon a foundation peculiar to itself, and is distinguished from every other right, that it *cannot* be given up. Property may be resigned, transferred, or submitted to the regulation of others; a man may relinquish his ease, and subject himself to inconveniences, and be not only innocent but laudable; nay, he may sacrifice life itself, and merit the highest applause; but his conscience he cannot resign.

To "prove all things, and hold fast that which is good," is not only a privilege but a duty; an obligation laid upon him by the very nature of religion and virtue, and from which he cannot discharge himself without departing from the principles of both. It must always remain entire to him; nor, while the principles of the most reasonable liberty are allowed to subsist in their due extent, can any attempt be consistently made to take it from him.

From these principles it has been inferred, that toleration, so far from being a matter of mere grace or favour, which government has a right to withhold, grant, abridge, or resume at pleasure, is the acknowledgment and confirmation of a right: not one of those adventitious rights, which are subsequent to the establishment of civil societies, and arise out of the peculiar forms and constitution of it; but of those higher rights which belong to men as such, and which ought to be preserved under all states and governments whatever, as effectually, universally, and impartially as any other right. With regard to the extent of toleration, it is urged, that if liberty of conscience be a right essential to human nature, all penalties in cases merely of a religious nature must be an infringement of a right, and a degree of oppression, though inflicted by a law. Farther, the inquiry concerning the persons entitled to toleration does not depend on the supposed truth or error of the sentiments which men may adopt, but upon the common right, which all men have, to be led in these points by the light of their own minds, and to enjoy all the securities and benefits of society, while they fulfil the obligations of it. All who can give good security to the government under which they live, and to the community to which they belong, for the performance of the duties of good subjects and good citizens, have an undoubted claim to it, and cannot with any just reason be deprived of it. It is not error, but injury to the state, or the individuals who are under the care of it, which justifies the animadversion of the magistrate; and all to whom this cannot be justly imputed, are the objects of his protection.

Archdeacon Paley distinguishes two kinds of toleration: the one *partial*, which is the allowing to dissenters the unmolested profession and exercise of their religion, but with an exclusion from offices of trust and emolument in the state; and the other *complete*, which is the admission of them, without distinction, to all the civil privileges and capacities of other citizens. The justice and expediency of toleration in general is founded by this ingenious writer primarily in its conduciveness to truth, and in the superior value of truth to that of any other quality which a religion can possess. Besides this principal argument for toleration, there are

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other auxiliary considerations that are important. The restriction of the subject to the religion of the state is a needless violation of natural liberty, and in an instance with regard to which constraint is always grievous. Persecution produces no sincere conviction, nor any real change of opinion; on the contrary, it vitiates the public morals, by driving men to prevarication, and commonly ends in a general though secret infidelity, by imposing, under the name of revealed religion, systems of doctrine, which man cannot believe, and dare not examine: finally, it disgraces the character, and wounds the reputation of Christianity itself, by making it the author of oppression, cruelty, and bloodshed. Our author includes under the idea of religious toleration the toleration of all books of serious argumentation, without deeming it any infringement of religious liberty to restrain the circulation of ridicule, invective, and mockery upon religious subjects.

Concerning the admission of dissenters from the established religion to offices and employments in the public service, which is necessary to render toleration *complete*, doubts, says Dr. Paley, have been entertained with some appearance of reason. In vindication of these doubts, he refers to those who hold religious opinions that are utterly incompatible with the necessary functions of civil government; enthusiasts, who maintain that all distinction of property is abolished by Christianity, and that the gospel enjoins upon its followers a community of goods; and to Quakers or Friends, who believe it to be contrary to Christianity to take up arms. He allows, however, that with the single exception of refusing to bear arms, the various sects of Christians which actually prevail in the world hold no tenet which incapacitates men for the service of the state. It has indeed been asserted, that discordancy of religions, even supposing each religion to be free from any errors that affect the safety or the conduct of government, is enough to render men unfit to act together in public stations. But upon what argument, or upon what experience, is this assertion founded? "I perceive no reason," says this liberal writer, "why men of different religious persuasions may not sit upon the same bench, deliberate in the same council, or fight in the same ranks, as well as men of various or opposite opinions upon any controverted topic of natural philosophy, history, or ethics." For a further account of this author's sentiments on toleration and collateral subjects, see RELIGION, SUBSCRIPTION, and TEST-*Act*.

To the term *toleration*, though it has been adopted by Mr. Locke and several writers of the first distinction, others have objected; alleging that, as words have a considerable influence on opinions, this term appears to be injurious to that religious liberty, which it is designed to import. It implies a *right* to impose articles of faith, and modes of worship; that nonconformity is a crime; and that the *sufferance* (toleration) of it is a matter of favour or lenity. But the nonconformist in every country, whether he be a Christian at Constantinople, a Protestant at Rome, an Episcopalian in Scotland, or a Presbyterian in England, and, we may add, a Catholic in any part of Great Britain, if his rational principles be consonant to his practice, will regard this claim of *right* as usurpation; and will urge, that it has been neither conferred by Jesus Christ, nor delegated by the people. Our Saviour expressly declares, "My kingdom is not of this world;" and his religion was persecuted and oppressed, during the period of its greatest purity and perfection, and when the ministers of it had gifts and powers which are now unknown. The people could not delegate such a right to any man or body of men; for the human mind is so mutable, that no individual can fix a standard of his

own faith, much less can he commission another to establish one for him and his posterity; and this power would be in no hands so dangerous as in those of the statesman or priest, who has the folly and presumption to think himself qualified to exercise it. The use of this term was introduced at a time, when very imperfect notions of religious liberty, and very erroneous ideas of the authority of the civil magistrate in the province of religion, prevailed. In its literal acceptation, it is without doubt objectionable, and incompatible with just views of religious liberty. What human being, however exalted his rank or extensive his influence, can presume to *tolerate* or *suffer* a fellow-creature to worship God according to the dictates of his own conscience, and in that way, or according to those rites and forms, which he apprehends the object of his worship has prescribed; or, in other words, to *tolerate* God in receiving that worship; for to this extreme the argument may be extended. All disabilities and penalties incurred by not worshipping God, and performing other acts of religion, according to any merely human ritual, are in fact prohibitions against man's rendering and God's receiving the homage of the understanding and the heart. Toleration, it has been said, supposes on the part of those who exercise it an authority, to which they have no just claim; and on the part of those who are the objects of it, a certain degree of criminality and culpability, which the persons that exercise the right of toleration condescend to excuse and allow. Such are the ideas which some modern writers have entertained on this subject; and accordingly they have wished for a diffuse of the term, as it is founded in, and leads to, error. Liberty, whether it be complete, or partial, is a term well understood; and the use of it is less liable to objection than that of toleration.—See on this subject, Fowles's Inquiry into the Principles of Toleration, &c. 8vo. 1772. Locke's Letters concerning Toleration, in his Works, vol. ii. p. 231, &c. Hoadley's Rights of Subjects, passim. Paley's Philosophy, vol. ii. c. 10. Percival's Essay on Truth, p. 90.

To the account above given of the general principles of toleration, it will be proper to add a few words concerning the state of toleration in our own country. With regard to the Protestant-dissenters in general, see DISSENTERS, NON-CONFORMISTS, and QUAKERS. See also CONVENTICLE, CORPORATION-*Act*, SHERIFF, and TEST.

As for dissenting teachers, or ministers in particular, they were prohibited by 17 Car. II. cap. 2. from coming within five miles of a city, town-corporate, or borough, unless only in passing upon the road, or unless required by legal process, without taking an oath of allegiance therein mentioned, on pain of 40*l.*, and of commitment by two justices, on oath of the offence, for six months. And by 22 Car. II. cap. 1. preaching in any meeting or conventicle, in other manner than according to the practice of the church of England, incurred a forfeiture of 20*l.* for the first offence, and for every other offence 40*l.* Moreover, by 13 & 14 Car. II. cap. 4. no person shall presume to consecrate and administer the sacrament before he be ordained priest, according to the form of the church of England, on pain of 100*l.* But now by 1 W. cap. 18. commonly called the Act of Toleration, which, by 19 Geo. III. cap. 44. is declared to be a public act, they are exempted from the penalties of those statutes, upon taking the oaths of allegiance and supremacy, and subscribing the declaration against popery; and also, by 1 W. cap. 18. subscribing the articles of religion mentioned in the stat. 13 Eliz. cap. 12. (which only concern the confession of the Christian faith and the doctrine of the sacraments) with an express exception of those relating to the government and powers of the church,

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church, and to infant baptism; or if they scruple subscribing the articles, upon making and subscribing the declaration prescribed by stat. 19 Geo. III. cap. 44. professing themselves to be Christians and Protestants, and that they believe the Scriptures of the Old and New Testament, as commonly received among Protestant churches, to contain the revealed will of God, and that they receive the same as the rule of their doctrine and practice; for the register of which they shall pay 6*d.* to the officer of the court and no more, and 6*d.* for a certificate thereof signed by such officer. A farther enlargement of the Toleration Act, in favour of those who impugn the doctrine of the Trinity, was made by 53 Geo. III. c. 160.

Any preacher or teacher, duly qualified, shall be allowed to officiate in any congregation, although the same be not in the county where he was so qualified, provided that the place of meeting hath been duly certified and registered, and such teacher or preacher shall, if required, produce a certificate of his having so qualified himself, and before any justice of such county where he officiates, make and subscribe such declaration, and take such oaths as aforesaid, if required. (10 Annu. cap. 2.) And every such teacher, having taken the oaths, and subscribed as above, shall from thenceforth be exempted from serving in the militia, or on any jury, or from being appointed to bear the office of churchwarden, overseer of the poor, or any other parochial or ward office, or other office in any hundred, city, town, parish, division, or wapentake. For the state of dissenting school-masters, see *SCHOOL-Master*.

In consequence of the Toleration Act, non-conformity is no longer a crime in the eye of the law, and the penalties to which it was obnoxious are not only suspended, but absolutely annulled with regard to those dissenters who are qualified as the act directs. See *Furneaux's Letters to Judge Blackstone*, letter i. See *DISSENTERS*.

For an account of the laws relating to Papists or Catholics, see *PAPISTS*. We shall here state the toleration granted to Catholics by the 31 Geo. III. c. 32. By this act it shall be lawful for persons professing the Roman Catholic religion, to appear in any of the courts at Westminster, or at the general quarter sessions for the county, city, or place where he shall reside, and there in open court, between the hours of nine in the morning and two in the afternoon, take, make, and subscribe the following declaration and oath: *viz.*

"I A. B. do hereby declare, that I do profess the Roman Catholic religion.

I A. B. do sincerely promise and swear, that I will be faithful and bear true allegiance to his majesty king George the Third, and him will defend to the utmost of my power, against all conspiracies and attempts whatsoever, that shall be made against his person, crown, or dignity; and I will do my utmost endeavour to disclose and make known to his majesty, his heirs and successors, all treasons and traitorous conspiracies which may be formed against him or them: and I do faithfully promise to maintain, support, and defend, to the utmost of my power, the succession of the crown; which succession, by an act intitled, *An Act for the further limitation of the crown and better security of the rights and liberties of the subjects*, is and stands limited to the princess Sophia, electress and duchess dowager of Hanover, and the heirs of her body, being Protestants, hereby utterly renouncing and abjuring any obedience or allegiance unto any other person claiming or pretending a right to the crown of these realms. And I do swear, that I do reject and detest, as an unchristian and impious position, that it is lawful to murder or destroy any person or persons whatsoever, for or under pretence of their being heretics or infidels; and also

that unchristian and impious principle, that faith is not to be kept with heretics or infidels. And I do further declare that it is not an article of my faith, and that I do renounce, reject, and abjure the opinion, that princes excommunicated by the pope and council, or any authority of the see of Rome, or by any authority whatsoever, may be deposed or murdered by their subjects, or any person whatsoever. And I do promise that I will not hold, maintain, or abet any such opinion, or any other opinion contrary to what is expressed in this declaration. And I do declare, that I do not believe that the pope of Rome, or any other foreign prince, prelate, state, or potentate, hath or ought to have any temporal or civil jurisdiction, power, superiority, or pre-eminence, directly or indirectly, within this realm. And I do solemnly, in the presence of God, profess, testify, and declare, that I do make this declaration, and every part thereof, in the plain and ordinary sense of the words of this oath, without any evasion, equivocation, or mental reservation whatever; and without any dispensation already granted by the pope, or any authority of the see of Rome, or any person whatever; and without thinking that I am or can be acquitted before God or man, or absolved of this declaration, or any part thereof, although the pope or any other person or authority whatsoever shall dispense with or annul the same, or declare that it was null or void."

Which said declaration and oath shall be subscribed by such person with his name at full length, if he can write, and if not, with his mark, and his name shall be written by the officer, adding his title, addition, and place of abode, which shall there remain of record: and such officer shall make, subscribe, and deliver a certificate of such declaration and oath having been duly made and taken, if demanded, for which he shall have 2*s.*; which certificate shall be competent evidence, unless falsified.

And such officer shall yearly, on or before the 25th of December, transmit to the privy council lists of the persons, with their titles, additions, and places of abode, who shall have made and subscribed such declaration and oath in the preceding year.

And no Roman Catholic, who shall have taken and subscribed the said oath as aforesaid, shall be convicted upon any of the acts following; *viz.* 1 Eliz. c. 2. 23 Eliz. c. 1. 29 Eliz. c. 6. 35 Eliz. c. 2. 1 Jac. I. c. 4. 3 Jac. I. c. 4. 3 Jac. I. c. 5. and 7 Jac. I. c. 6. or any other statute or law of this realm; or in any ecclesiastical court, for not resorting to church, or having servants who shall not resort to church, or other place of common prayer.

And by 43 Geo. III. c. 30. Roman Catholics taking and subscribing the declaration and oath contained in the 31 Geo. III. c. 32. shall be entitled to all the benefits of the 18 Geo. III. c. 60. to every purpose as if they had taken the oath thereby prescribed.

And whereas, by 23 Eliz. c. 2. 27 Eliz. c. 2. 35 Eliz. c. 2. 2 Jac. I. c. 4. 3 Jac. I. c. 5. 3 Car. I. c. 2. 25 Car. II. c. 2. Papists are made subject to several punishments, penalties, and disabilities, it is enacted that no person who shall take and subscribe the said oath in manner aforesaid shall be prosecuted or convicted for being a Papist, or reputed Papist, or for professing or being educated in the Popish religion, or for hearing or saying mass, or for being a priest or deacon, or entering or belonging to any ecclesiastical order or community of the church of Rome, or for being present at or performing or observing any rite, ceremony, practice, or observance of the popish religion, or maintaining or assisting others therein.

Provided always, that no place of congregation or assembly for religious worship shall be allowed, until the place

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of such meeting shall be certified to the sessions of the county or place in which the same shall be held, and be there recorded; and the clerk of the peace shall give a certificate thereof, if demanded, for which he shall have *6d.* And no minister or other person shall officiate in any such place of meeting until his name and description as a priest or minister shall have been recorded at the sessions, for which shall be paid *6d.* and a certificate thereof shall be granted, if demanded, for which shall be paid *2s.* And no priest or minister who shall officiate in any such meeting not so recorded as aforesaid shall be deemed to be within the benefit of this act for any purpose whatsoever.

Provided, that if any such place of assembly shall have the doors locked, barred, or bolted, during the time of meeting, all persons who shall come to or be at such meeting shall receive no benefit from this act, notwithstanding his having taken such oath as aforesaid, but shall be liable to the same pains and penalties, as if this act had not been made.

If any Roman Catholic shall hereafter be appointed high or petty constable, churchwarden, overseer of the poor, or any other parochial or ward office, and shall scruple to take upon him any of the said offices, he may execute the same by a sufficient deputy, to be approved of in like manner as other persons.

Every minister of any Roman Catholic congregation who shall take and subscribe the said oath in manner aforesaid, shall be exempt from serving on juries, and from the office of church-warden, overseer, or other parochial or ward office, or other office in any hundred of any shire, city, town, parish, division, or wapentake.

But all laws made for frequenting divine service shall continue in force, unless where persons shall come to some religious worship permitted by this act, or an act of 1 W. & M. for exempting Dissenters.

And if any person shall wilfully and on purpose maliciously and contemptuously come into any congregation or assembly of religious worship permitted by this act, and disturb the same; or misuse any priest, minister, preacher, or teacher therein, he shall, on proof by two witnesses, before one justice, find two sureties of the peace to be bound by recognizance in *50l.* and in default thereof, shall be committed to prison till the next sessions, and on conviction of such offence at the sessions, shall forfeit *20l.* to the king.

Provided, that no benefit herein contained shall extend to any Roman Catholic ecclesiastic permitted by this act, who shall officiate in any congregation, or assembly hereby permitted, with a steeple and bell, or at any funeral in any church or church-yard; or who shall exercise any of the rites or ceremonies of his religion; or wear the habits of his order, save within some place of congregation, or assembly for religious worship permitted by this act; or in any private house where there shall not be more than five persons assembled besides those of the household; or who

shall not previously to his so exercising his function have taken the oath of allegiance, abjuration, and declaration hereby appointed, in manner aforesaid.

But nothing herein shall exempt any Roman Catholic from paying tithes or other parochial duties, or any other duties to the church or minister; or to repeal any part of 26 Geo. II. c. 33. "for preventing clandestine marriages," or any parts of any statutes concerning marriages; or to give any ease or benefit to any person who shall, by preaching, teaching, or writing, deny or gainsay the oath and declaration aforesaid, or the doctrines therein contained, or any of them; or to repeal or affect any law concerning the right succession to or limitation of the crown.

And no Roman Catholic, who shall take and subscribe the said oath of allegiance, abjuration, and declaration, as aforesaid, shall be prosecuted for teaching youth as a tutor or school-master; but he shall not hold any mastership of any college, or school of royal foundation, or of any other endowed college or school for the education of youth; nor shall keep a school in either of the universities; nor shall receive into his school for education the children of any Protestant father; nor shall teach any school until his name shall be entered at the sessions in manner aforesaid, as a Roman Catholic schoolmaster: and no person officiating in the premises shall receive any benefit from this act.

Provided also, that nothing herein shall make it lawful to found, endow, or establish any religious order or society of persons bound by monastic or religious vows; or any school, academy, or college by any Roman Catholic; and that all uses, trusts, and dispositions, whether of real or personal property, before deemed to be unlawful, shall continue to be so deemed.

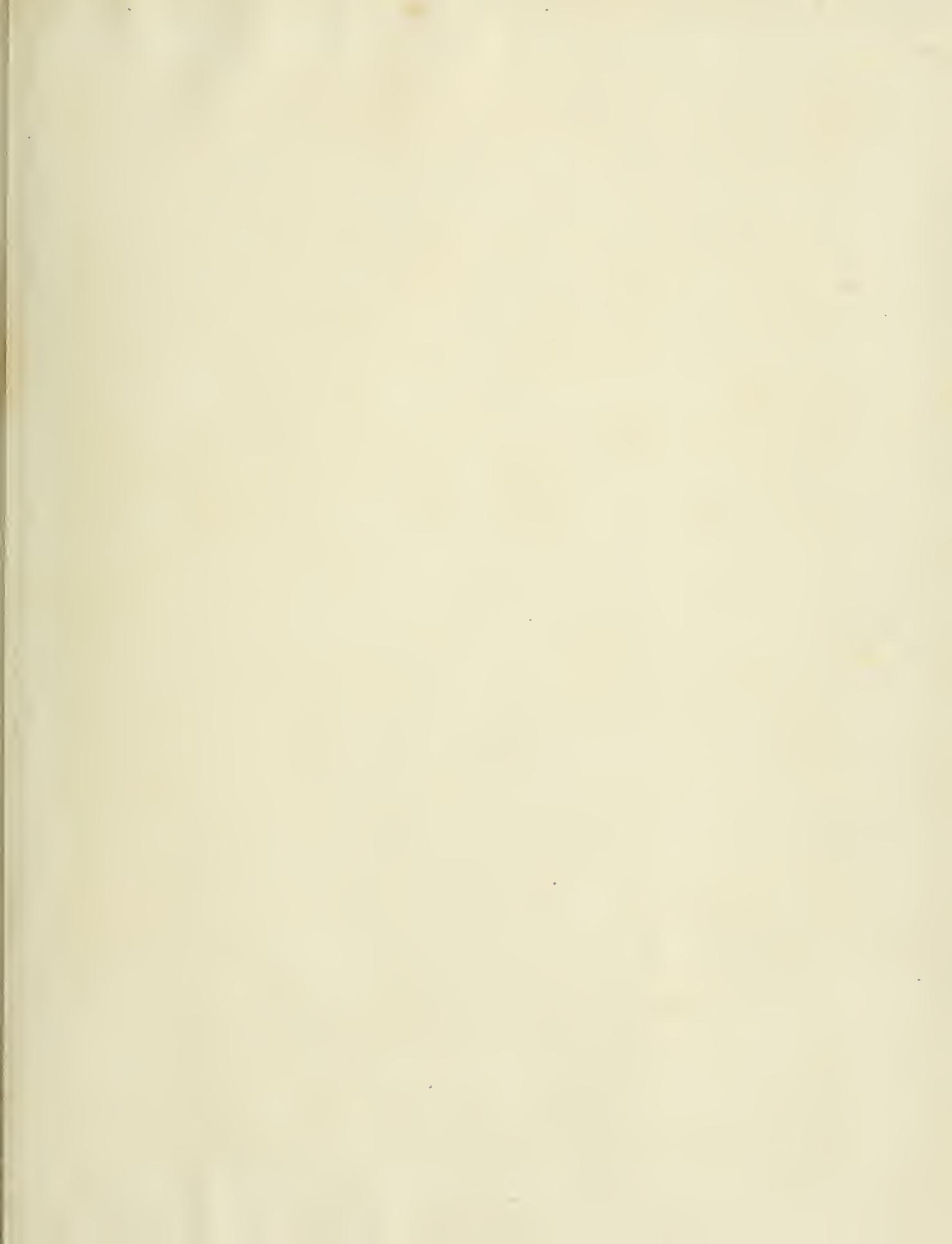
No person shall be summoned to take the oath required by 1 W. & M. sess. 1. c. 8. or the declaration required by 25 Geo. II. c. 2. Nor shall the 1 W. & M. sess. 1. c. 9. for removing Papists from London and Westminster, extend to Roman Catholics who shall have taken and subscribed the oath, &c. herein appointed.

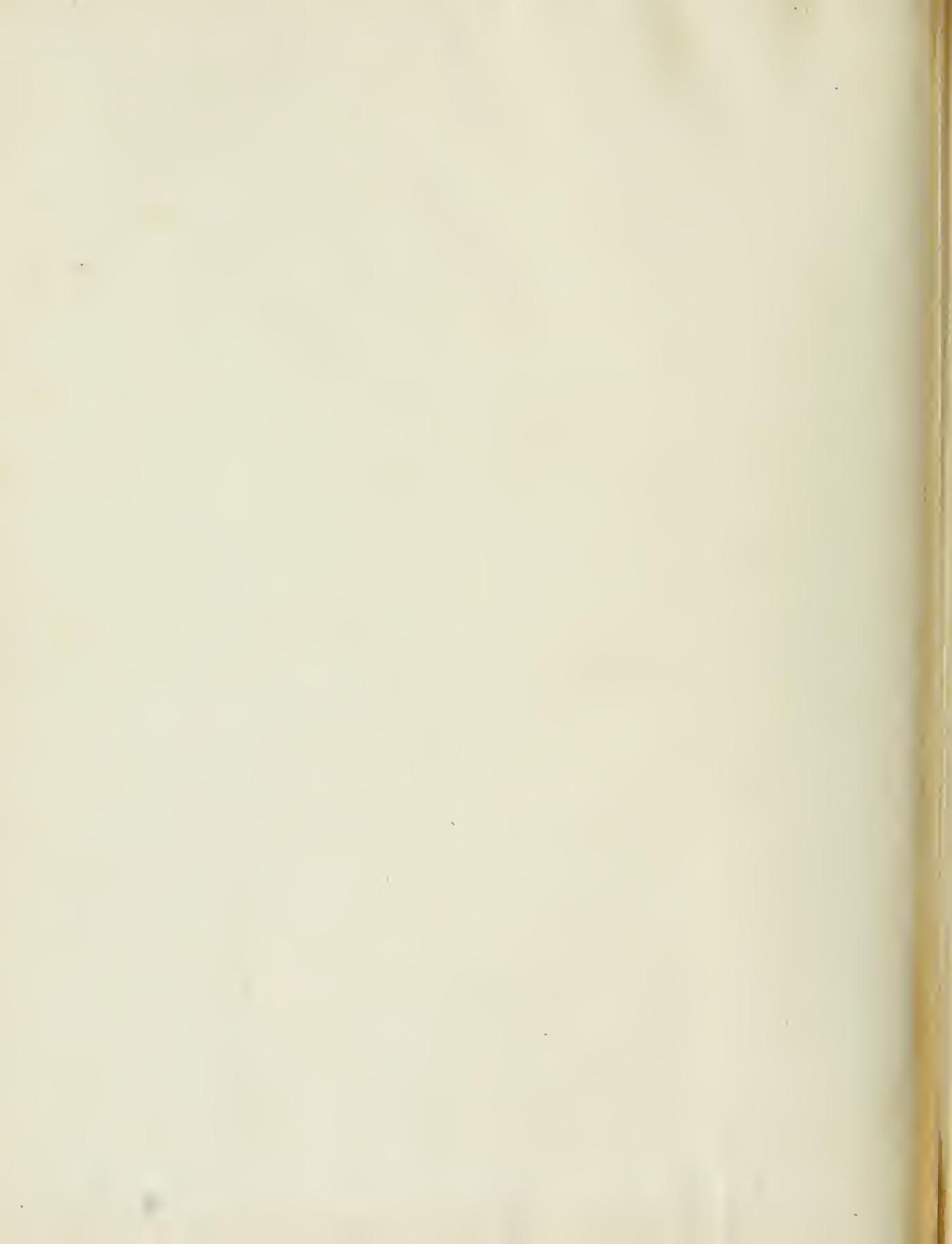
No peer who shall have taken and subscribed the said oath, &c. in manner aforesaid, shall be liable to be prosecuted under 30 Car. II. st. 2.

And the 1 Geo. I. sess. 2. c. 55. and 3 Geo. III. c. 18. requiring Papists to register their names and real estates are repealed; and all deeds and wills of Papists shall, after the 24th of June 1791, be good as if the said acts had never been made.

And whereas by 7 & 8 Will. c. 4. and 1 Geo. I. st. 2. c. 13. every person acting as a counsellor at law, barrister, attorney, solicitor, clerk, or notary, not having taken the oaths and declaration therein prescribed, should be liable to certain penalties, it is enacted that these oaths and declarations shall be no longer required; but the oath and declaration herein appointed shall be taken in lieu thereof, in manner aforesaid.

END OF VOL. XXXV.





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